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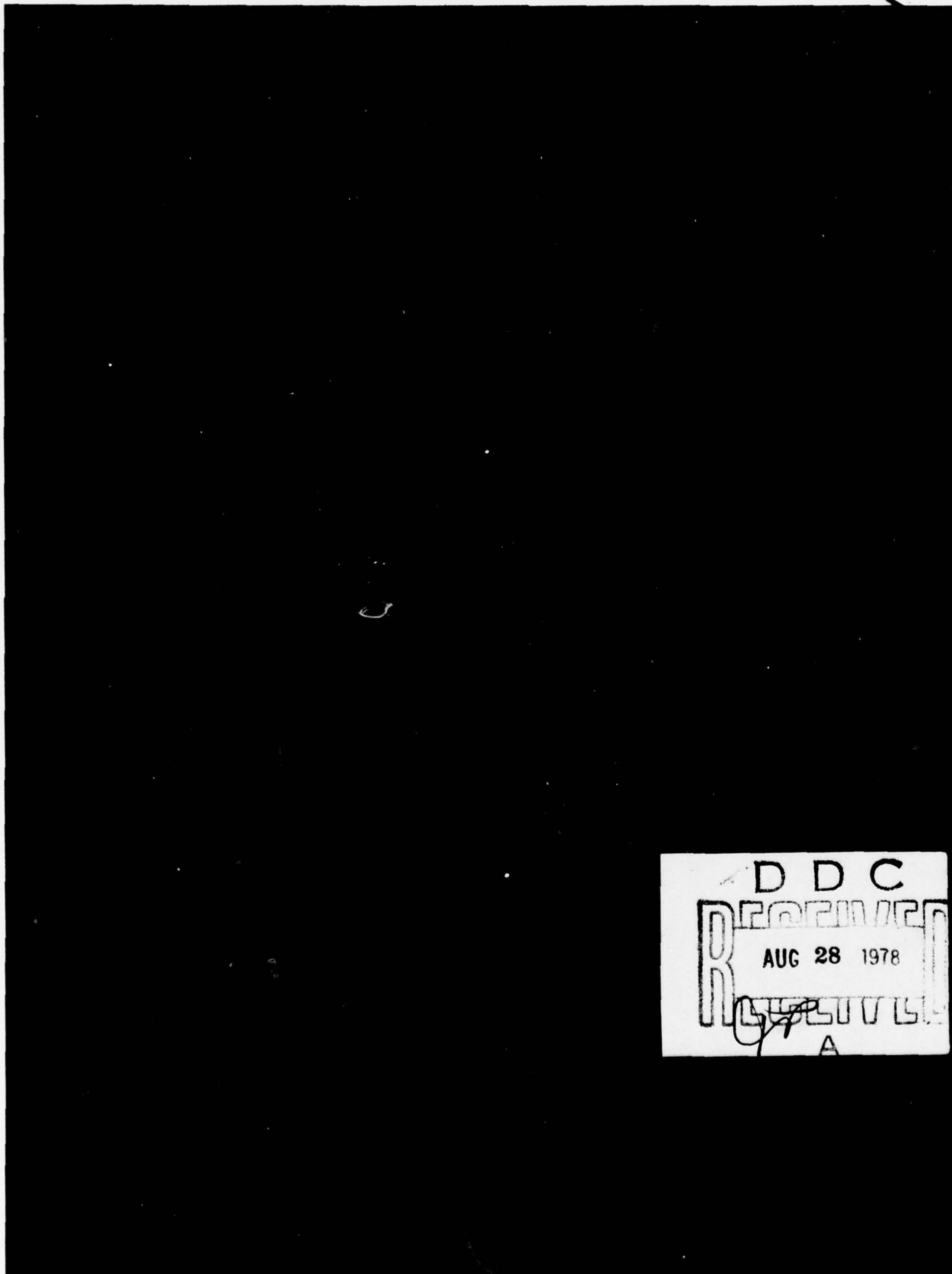

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Schools of Engineering
Purdue University
West Lafayette, Indiana 47907

(12)

(6) MINUTES

FIFTH ANNUAL MEETING of

INTERNATIONAL PURDUE WORKSHOP

ON INDUSTRIAL COMPUTER SYSTEMS

(5th)

per DDC

Minutes.

PART I.

NARRATIVE - CHAPTERS I - X

AND

TECHNICAL APPENDICES I.

(12) 387p.

(11) 1977

Held at

Purdue University, on

October 3-6, 1977.

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Industrial Computer Systems

is

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by the Automatic Control Systems Division,
the Chemical and Petroleum Industries Division,
and the Data Handling and Computations Division
of the
Instrument Society of America;

by the
Japan Electronic Industry Development Association
(JEIDA) through the IPW Japan Committee;
and by the Commission of the European Communities
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through the
Data Acquisition and Control Committee
of the Computer Society
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TABLE OF CONTENTS

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TABLE OF CONTENTS (Cont.)

TABLE OF CONTENTS (Cont.)

TABLE OF CONTENTS (Cont.)

CHAPTER I

INTRODUCTION

MINUTES OF THE FIFTH ANNUAL MEETING
INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

Purdue University

October 3-6, 1977

CHAPTER I

INTRODUCTION

ABSTRACT

1. Organization

This Document presents the minutes and reports of

~~The~~ The Fifth Annual Meeting of the International Purdue Workshop on Industrial Computer Systems which met at Purdue University, West Lafayette, Indiana, U.S.A., on October 3-6, 1977.

ABSTRACT

Those individuals listed in the Appendix I registered for the meeting. The Agenda of Insert I was followed.

Mr. Nicholas E. Malagardis, Chairman of Purdue-Europe, presented the report of the European Regional Meeting and the events which had occurred there since that meeting. Insert II reproduces his report.

Professor Mitsuru Terao presented the corresponding report of the Japanese Regional Meeting and of the activities of Purdue-Japan. His report is given in Insert III.

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2. Mr. Richard L. Curtis

It is with deep regret that we announce the death on Wednesday evening, December 28, 1977, of Mr. Richard L. Curtis. Dick was very active with the International Purdue Workshop and had served us in a wide variety of posts including Vice Chairman of Planning, Chairman of the Functional Requirements Committee, and of the Interface and Data Communications Committee and as a very active member of the Executive Committee.

Dick was Manager, Process Control Computer Systems for the Aluminum Company of America and was instrumental in the major strides which that company has made in the industrial computer control field.

We will miss his enthusiasm and his wise counsel in the Workshop.

3. Professor Mitsuru Terao

Professor Mitsuru Terao has reported to us that he will retire from his position as Professor of Mathematical Engineering and Instrumentation Physics at the University of Tokyo in March 1978. As a result he will resign from his Chairmanship of the IPW Committee of JEIDA or Purdue-Japan. As is outlined on page 18 of the Minutes of the Fourth Annual Meeting, he has also served as Chairman of the Ad-Hoc Committee for Standardization of Industrial Computer Systems also of JEIDA.

INSERT I

AGENDAS AND SCHEDULES

FIFTH INTERNATIONAL MEETING

INTERNATIONAL PURDUE WORKSHOP

ON INDUSTRIAL COMPUTER SYSTEMS

Room 310
Stewart Center
Purdue University
West Lafayette, Indiana 47907

October 3-6, 1977

Monday, October 3, 1977

AM	
08:00 - 08:30	Registration - Room 310, Stewart Center
08:30 - 08:45	Introduction and Discussion of Workshop Program. Introduction of Committee Chairman. Committee Plans.
08:45 - 09:00	Report of the European Regional Meeting and Planned Activities. Mr. Nicholas E. Malagardis Regional Chairman
09:00 - 09:15	Report of the Japanese Regional Meeting and Planned Activities Dr. Mitsuru Terao, Chairman Committee for Standardization of Industrial Computer Systems
09:15 - 09:30	Coffee Break

INSERT I (Cont.)

09:30 - 10:30	A Tutorial Discussion on the Topic: "The Applications of Microprocessors to Process Control" Mr. Thomas G. Gaspar Director, Automation & Control Merck & Co., Inc. Rahway, New Jersey
M 10:30 - 12:00	Meetings of the Workshop Committees as Called by the Chairmen.
12:00 - 01:30	Lunch
PM 01:30 - 02:30	"A Report on the Status and Future Program of the Higher Order Languages Working Group of the U.S. Department of Defense" Lt. Col. William A. Whittaker Advanced Research Projects Agency Arlington, Virginia
02:30 - 02:45	Coffee Break
02:45 - Close	Meetings of the Workshop Committees as Called by the Chairmen.

<u>Tuesday</u>, <u>October</u> <u>4</u>, <u>1977</u>

AM 08:30 - 09:30	A Tutorial Discussion of the "Standardization Efforts in West Germany in the Field of Safety and Reliability and Security" Dr. Rudolph Konakovsky Institut fur Regelungstechnik und Prozessautomatisierung University of Stuttgart Seidenstrasse 36 D-7000 Stuttgart 1 GERMANY
09:30 - 09:45	Coffee Break
M 09:45 - 12:00	Meetings of the Workshop Committees as Called by the Chairmen.

INSERT I (Cont.)

12:00 - 01:30	Lunch
01:30 - 02:30	Organizational Meeting International Purdue Workshop on Industrial Computer Systems Report of the Executive Committee Actions and Proposals Report of the Vice Chairman for Standards Dr. Thomas J. Harrison Vice Chairman Report of the Vice Chairman for Planning Mr. Robert S. Crowder, Jr. Vice Chairman Report of the Nominating Committee Mr. Richard H. Caro American Regional Chairman Election of Officers Discussion of Workshop Structure.
02:30 - 02:45	Coffee Break
02:45 - Close	Meetings of the Workshop Committee as Called by the Chairmen.
08:00 - Close	Meetings of the American Regional Branch and of the USTAG, ISO/TC97/SC5/WG1.

Wednesday, October 5, 1977

AM 08:30 - 09:30	"Tasking - Past and Present" Dr. Matthew Gordon-Clark Chairman Panelists: Mr. Richard H. Caro The Foxboro Company Foxboro, Massachusetts

INSERT I (Cont.)

Professor Odd Petersen
Norwegian Inst. of Technology
Div. of Engineering Cybernetics
7034 Trondheim-NTH
Norway

Mr. Alex J. Arthur
IBM Corporation
San Jose, California

Mr. Peter Elzer
Tandemlabor
Physics Institute III
University of Erlangen
Erlangen, Germany

Dipl-Ing. Thierry Lalive d'Epinay
Hybridrechenzentrum der ETH
Voltastrasse 18
CH-8044 Zurich
Switzerland

09:30 - 09:45	Coffee Break
M 09:45 - 12:00	Meetings of the Workshop Committee as Called by the Chairmen.
PM 12:00 - 01:30	Lunch
01:30 - 02:30	IBM Series/1 PL/I Mr. Alex J. Arthur The IBM Company San Jose, California
02:30 - 02:45	Coffee Break
02:45 - Close	Meetings of the Workshop Committee as Called by the Chairmen
PM 08:00 - 09:00	PL/M - A High Level Programming Language for Microprocessor Application Mr. Thomas S. Lehman Manager of Training, Midwest Intel Corporation Oak Brook, Illinois

INSERT I (Cont.)

Thursday, October 6, 1977

AM 08:30 - 09:30	"The Impact of New Trends in Hardware on Computer System Interfaces" R. Warren Gellie Chairman Panelists: Mr. Anthony D. Deramo Westinghouse Electric Orlando, Florida Mr. Charles Farmer Honeywell, Inc. Ft. Washington, Pennsylvania Dr. Daniel T. W. Sze IBM Corporation Boca Raton, Florida
09:30 - 09:45	Coffee Break
09:45 - 12:00	Meetings of Workshop Committees as Scheduled by the Committee Chairmen
M 12:00 - 01:30	Lunch
01:30 - 01:45	Presentation of Results of Deliverations of the FORTRAN Committee Dr. Matthew Gordon-Clark Voting on any Proposals Arising from FORTRAN Committee Work Presentation of Results of Work of the Systems Reliability, Safety, and Security Committee Mr. Roy W. Yunker

INSERT I (Cont.)

01:45 - 02:00	Presentation of Results of Deliberations of the Man/Machine Interface Committee Mr. Lyle Simon Voting on any Proposals to be Made by the Committee
02:00 - 02:15	Presentation of Results of Work of LTPL Committee and Discussion of the IRONMAN Review Mr. Peter Elzer Voting on any Proposals to be Made by the Committee
02:15 - 02:30	Coffee Break
02:30 - 02:45	Presentation of Results of the Interface and Data Transmission Committee Mr. R. Warren Gellie Voting on any Proposals to be Made by the Committee
02:45 - 03:00	Operating System Committee Dipl-Ing. Thierry Lalive d'Epinay Voting on any Proposals to be Made by the Committee
03:00 - 03:30	Presentation of Results of Work of the Problem-Oriented Languages Committee Mr. Nicholas E. Malagardis Dr. Theodore J. Williams Voting on any Proposals to be Made by the Committee
03:30 - 03:45	Presentation of Results of Work of the BASIC Committee Mr. Richard H. Caro Voting on any Proposals to be Made by the Committee

INSERT I (Cont.)

03:45 - 04:00	Microcomputer Ad-Hoc Committee Mr. Yoel Keiles Honeywell, Inc.
04:00 - 04:15	Report of the Deliberations of the USTAG of ISO/TC97/SC5/WG1 of Tuesday evening. Dr. Thomas J. Harrison
04:15 - 05:00	New Business Discussion of Time of Next Meeting of Workshop

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

REAL-TIME FORTRAN COMMITTEE (TC-1)

October 3-6, 1977

The FORTRAN Committee (TC-1) will devote most of its time to consideration of S61-3. In particular, the complete technical contents of this document will be decided on at this meeting. The details of the actual document will not be decided at the meeting but no new ideas or features will be included after this meeting. This will permit the Committee to resolve the detailed description of the standard in the subsequent meetings. All persons having an interest in the standard, which covers tasking on the mechanisms for inter program control, are urged to attend this meeting. Any ideas submitted to the Committee after this meeting will be deferred until another standard is developed or until the current standards are reviewed (this occurs every five (5) years).

The content of S61-3 concerns what is generally called "tasking". Over recent years the Committee has developed a state diagram to describe the tasking problem which is Markovian (the transition from each state is independent of the transition into the state) and uses the concept of a virtual processor. With this model, the following application areas have been considered for a task.

Initiation
Termination
Exception Handling
Task Synchronization
Critical Regions
Inter-Task Communications

INSERT I (Cont.)

Recent Committee meetings (Purdue, April '77 and Foxboro, June '77) have decided to include initiation, termination, appropriate exception handling, and basic task synchronization in the standard. Critical regions are not included as requiring a "block" concept which is common in many languages (ALGOL, PL/1) but does not exist in FORTRAN. Inter-task communication is also left out of the standard as it was considered that files could be used for this purpose with the resolution of all contention problems using S61-2-1977.

It is hoped that a draft S61-3 will be ready by the 1st of September, 1977. This will be sent to all Committee members. Anyone else who wants a copy before the Purdue meeting, please let me know.

The agenda for the next meeting (not necessarily in this order) will be:

Report on ISA S61-1-1976
Report on ISA S61-2-1977
Report on ANSI X3J3
Report from the American Region of IPW-TC1
Report from the European Region of IPW-TC1
Report from the Japanese Region of IPW-TC1
Discussion of Draft S61-3.

IF YOU WISH TO INFLUENCE THE CONTENTS OF THE FORTRAN STANDARD ON TASKING, BE SURE TO COME TO THIS MEETING.

THIS IS YOUR LAST CHANCE.

Matthew R. Gordon-Clark
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

REAL-TIME BASIC COMMITTEE (TC-2)

October 3-6, 1977

1. Report on IRTB Activities.

2. Approval of Standardization Agreement.

3. Discussion of ANSI/ECMA Standard.

4. Discussion of IRTB Standards Proposal.

5. 1978 Activities.

6. A.O.B.

Eric Crichton
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE
LONG TERM PROCEDURAL LANGUAGES COMMITTEE (TC-3)

October 3-6, 1977

Monday, October 3, 1977

Administration and Planning

Tuesday, October 4, 1977

Discussion of "IRONMAN"

Wednesday, October 5, 1977

Further Discussion of the Green Sheets

Johannes Reh
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

PROBLEM-ORIENTED LANGUAGES COMMITTEE (TC-4)

October 3-6, 1977

Monday, October 3, 1977

Activities of the TC POL

Tuesday, October 4, 1977

Work of TC POL in Europe

Wednesday, October 5, 1977

Requirements of POL

Günter Musstopf
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

INTERFACES AND DATA TRANSMISSION GUIDELINES COMMITTEE (TC-5)

October 3-6, 1977

1. Review of Document IEC-SC65A/WG6 (Japan-2)

2. Presentation of Honeywell's TDC2000 Evaluated Against Japan Document

3. Report on IEC-SC65A/WG6

4. Discussion of Future Work Program

5. On Wednesday morning, October 5, we will have a special presentation (film and demonstration) of the fundamentals and current technology on:

   Fiber Optics Communication Links

   Mr. Carl Podlesny
   Senior Applications Engineer

   and

   Mr. Rodney Andersen
   Marketing Manager for Communication Fibers

   both from

   Galileo Electro Optics Corporation
   Galileo Park
   Sturbridge, Massachusetts 01518

R. Warren Gellie
Acting Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE
MAN-MACHINE COMMUNICATIONS COMMITTEE (TC-6)

October 3-6, 1977

Monday, October 3, 1977 (2:45 PM - Close)

Finalization of Bibliography

Tuesday, October 4, 1977 (9:45 AM - Noon)

Device-Independent Language Specifications

Wednesday, October 5, 1977 (9:45 - Noon)

Justification for Man/Machine Interface

Robert F. Carroll
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

SYSTEMS RELIABILITY, SAFETY, AND SECURITY COMMITTEE (TC-7)

Monday, October 3, 1977

1. Introduction of Members
2. Review of Objectives and Committee Purpose
3. Questions for Committee Discussion
   a. What Are Realistic Objectives for TC-7 Relating to Guidelines, Standards and/or Certification?
   b. What Would Your Company or Affiliation Like to See Emerge as A Safety, Security and Reliability System?
   c. Comments by Attendees Relating to Individual Interest.

Tuesday, October 4, 1977

Review of TC-7 (Europe, Japan, and America) and Interrelationships and Mutual Goal

Further Question Discussion

Establishment of Criteria for Hardware and Software Reliability

Wednesday, October 5, 1977

Development of Strategy and Organization of Committee

Discussion of Membership Plan

Final Summary of the Committee Strategy and Plans for the Coming Year.

Roy W. Yunker
Chairman

INSERT I (Cont.)

AGENDA

MEETINGS OF THE

REAL-TIME OPERATING SYSTEMS COMMITTEE (TC-8)

October 3-6, 1977

Monday, October 3, 1977

Presentation of on-going work and results of the Regional Committees (1 hour).

Discussion of the questionary of TC 8/A on the Report IV-1-4 of TC 8/E.

Tuesday, October 4, 1977

Presentation of the new up-to-date Report IV-1-5 of TC 8/E.

Discussion and decisions, to accept the different parts of the Report or suggested changes respectively.

Wednesday, October 5, 1977

Coordination of future work of the Regional Committees. Possibilities of creating an internationally approved Report, combining the work of the Regional Committees.

NOTE: It would be possible to have a general presentation of the new Up-to-date Report of TC 8/E which could be attended by all interested participants of the meeting.

Thierry LaLive d'Epinay
Chairman

INSERT II

PURDUE EUROPE CHAIRMAN'S REPORT

During the past year Purdue Europe has been reinforced in participation members and the label Purdue Europe is becoming slowly but surely well known to industry and standardization milieu in the old continent.

Since it is fashionable and has been requested that view graphs be used and since this will ease the comprehension of the relationships, let me show you how we situate Purdue Europe (Fig.1).

I think this shows you more than I could tell in a pure sequential manner and particularly with my deficient mastering of the Anglo American language.

I have said during my previous reports in this room that when working within Purdue Europe one stumbles on the complexities and byzantinisms of international committees.

So, the only body on which we could rely upon was and is the Commission of the European Communities (CEC); this does not make things as easy for us as one could suppose since this organization has to take care of all kinds of subtle conditions and thus create a consensus before reaching a decision.

When proposing projects to the Council of Ministers, the Commission has to prepare the way by a great number of paths through which explanations have to be given at every instance for those feeling concerned and who wish to discuss the matter on the opportunity. (Fig. 2).

INSERT II (Cont.)

You see that when I was speaking of a considerable amount of difficulties, I was not exaggerating at all.

Let me tell you and maybe bore you about the LTPL project or ERTL as our British colleagues like to call it. One has the feeling he is coming down that stair (Fig. 3).

This proposal has twice reached the status of a project, but the intentions behind it have never been clarified between the partners. I must confess to my opinion that the LTPL-E group did not arrive at a set of clear and cleanly integral specifications before the project was discussed at the various decision levels. So we are still in the initiation of a project which tends nevertheless to have a certain profile which is at the point of being admitted but is being continuously postponed.

Meanwhile, Purdue Europe (The name I was told sounds very American, but we are going to keep it in spite of our detractors) has passed a motion offering the Commission its potential of expertise and know how.

What we can expect from them is the following: Give us a technical mandate as far as their technical plans are concerned, continue supporting our meetings and even support some travel expenses especially to the U.S.A. Consider Purdue Europe as a technical expert body in questions of industrial computer standards development.

The relationship with the CEC now appears clear and has been to a degree officialized with our meeting taking place at ISPRA,

INSERT II (Cont.)

at the Euratom Research Center. This meeting took place with the full support of the Communities.

At that meeting a first official contact with ECMA took place; this was in parallel to the now established collaboration with TC 2 RT BASIC who work together in a common group with ANSI.

Participation in that meeting was more than 100, with eight participants from the Eastern European countries and 5 Americans.

The Workshop had an excellent tutorial by Prof. I.C. PYLE on structured programming and two panels on microprocessors:

(1) "The Influence of Microprocessors on Industrial Computer Systems," which was chaired by Prof. J. NICOUD of the University of LAUSANNE.

(2) "The Influence of Distributed Intelligence on Programming," chaired by Prof. R. BAUMANN of the University of MUNICH.

The interest in what is happening in the microcomputer field is confirmed by the main topics of this International Workshop. This topic is also closely followed by the European Distributed Intelligence Study Group, EDISG, whose birth was announced last year and which is very active in trying to elaborate some concrete rules in interfacing and mastering software in the microprocessors. As can be easily understood, the group is hesitating whether or not to include communication procedures in its basic work.

Purdue Europe presented its achievements and current activities to a Workshop on Possible Community Actions in Real

INSERT II (Cont.)

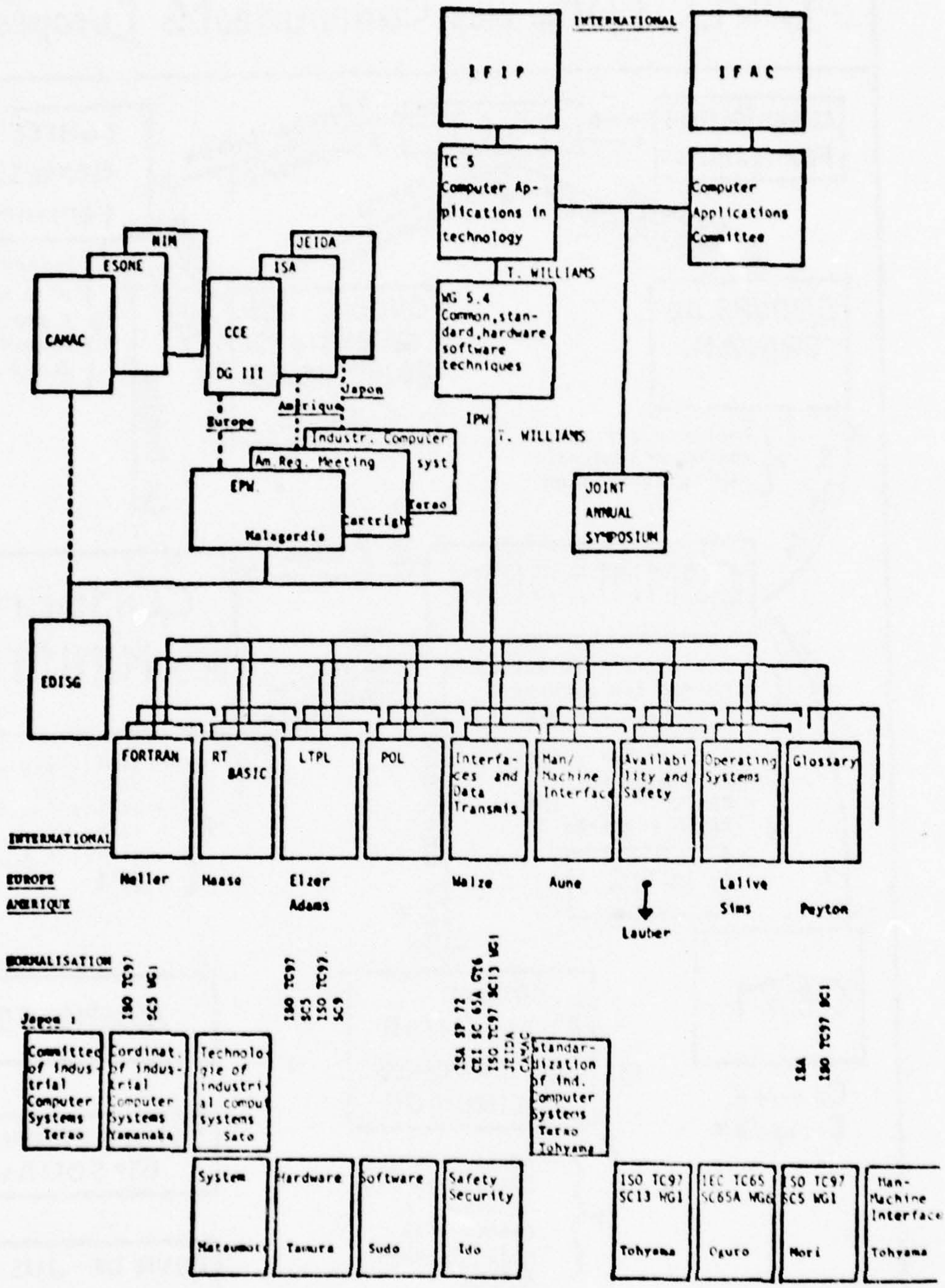
Time Informatics organized by the Commission in Brussels. Attendees were impressed by the work done and asked the Commission to take into consideration the activities of Purdue Europe. Special importance was accorded to papers presented by EHRENBERGER and TAYLOR of TC 7 and PENNIALL of TC 6. The Minutes of that Workshop are available from M. DESFOSSES DG III Commission of the European Communities, rue de la Loi 200, B-1048 BRUSSELS, BELGIUM.

Coming to some organizational details now I'm not going to comment on all TC activities one by one but I would like to mention the difficulties in the communications between the American and European FORTRAN Committees.

Another matter of concern is our liaison with the Japanese regional organization or should I say the non existence of any liaison. We do not know what they are doing or who they are. From time to time, there is a copy of a letter when they write to Ted WILLIAMS and by that means we know that structures have been changed but almost nothing on any special kind of work.

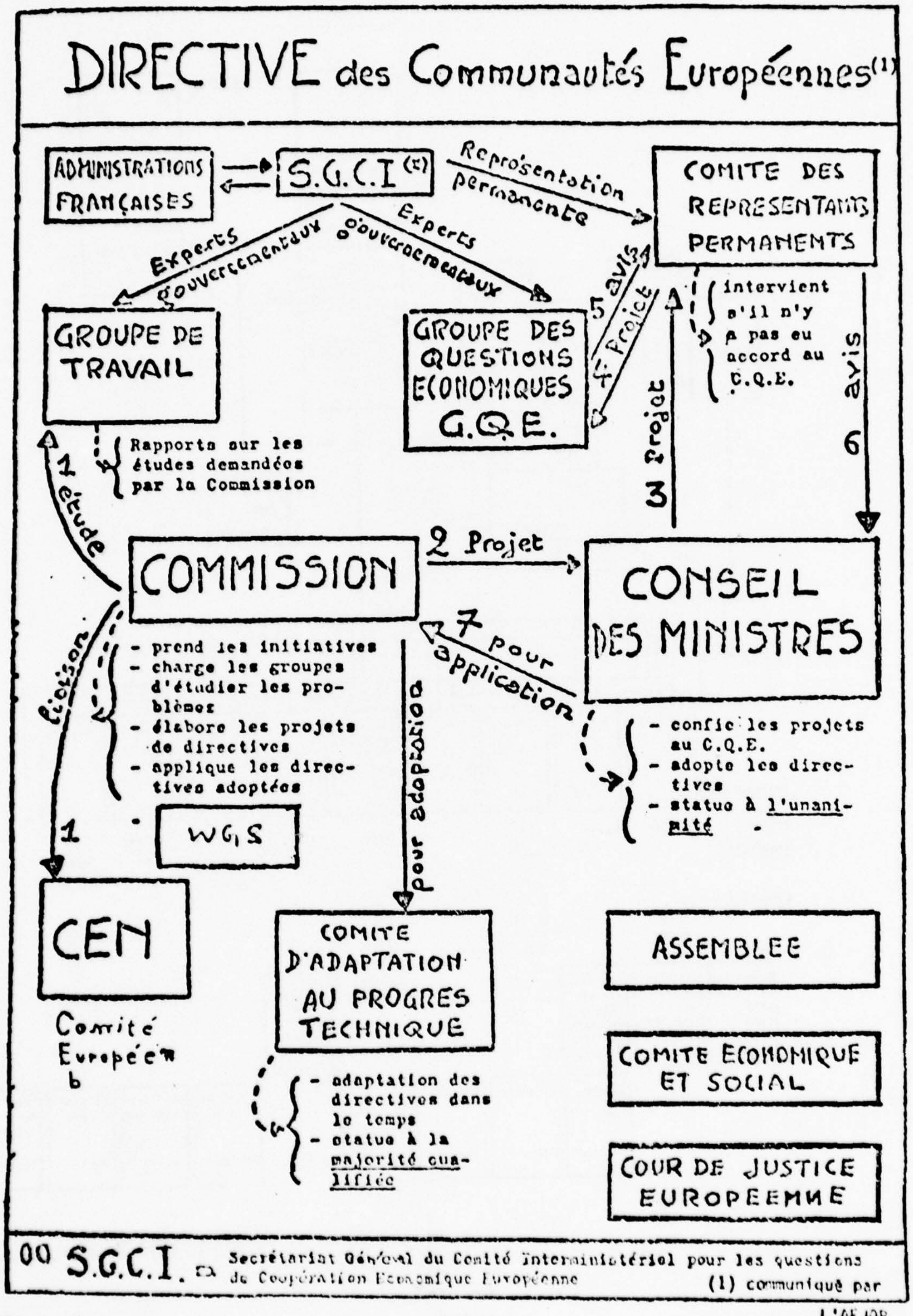
Computer Science or Informatics as we say in Europe is a world-wide phenomenon and standards practices is a world-wide phenomenon and this is an International Workshop whether we like it or not. Omphaloskepsis, navel contemplation, does not lead to anything but bad understanding and entertains suspicion.

So, allow me to make an appeal for a better circulation of ideas.



NEM 1977 January

Fig. 1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GROUPE DE TRAVAIL
GROUPE DES QUESTIONS ECONOMIQUES G.Q.E.
5 avis
4 Projet
intervient s'il n'y a pas eu accord au C.Q.E.
avis
6
Rapports sur les études demandées par la Commission
1 étude
3 Projet
COMMISSION
2 Projet
CONSEIL DES MINISTRES
7 pour application
liaison
- prend les initiatives
- charge les groupes d'étudier les problèmes
- élabore les projets de directives
- applique les directives adoptées
WG,S
pour adaptation
1
- confie les projets au C.Q.E.
- adopte les directives
- statue à l'unanimité
CEN
Comité Européen
COMITE D'ADAPTATION AU PROGRES TECHNIQUE
ASSEMBLEE
- adaptation des directives dans le temps
- statue à la majorité qualifiée
COMITE ECONOMIQUE ET SOCIAL
COUR DE JUSTICE EUROPEENNE
(x) S.G.C.I. Secrétariat Général du Comité Interministériel pour les questions de Coopération Economique Européenne
(1) communiqué par L'AFNOR

Fig. 2

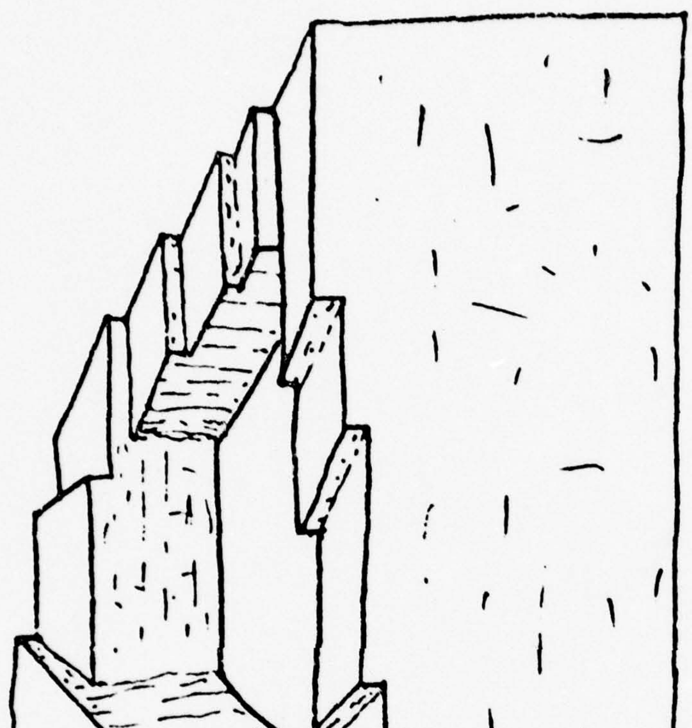

Fig. 3

INSERT III

Report of the Japanese Regional Meeting and Planned Activities

The works on Industrial Computer Systems in Japan Electronic Industry Development Association (JEIDA) have been carried by four technical committees of standardization, safety, software, hardware and survey as shown in Figure 1. Each committee consists of fifteen to twenty fixed members. They held monthly meeting to discuss the specified subjects and prepared four annual reports published by JEIDA as A-114, A-115, A-116 and A-117.

The Japanese Regional Meeting of the International Purdue Workshop on Industrial Computer Systems took place in Room 66, 67 and B-2, JEIDA, Tokyo, Japan, on June 29-30, 1977 in conjunction with the annual meeting of JEIDA committees on Industrial Computer Systems. The sixty individuals registered for the meeting. It was opened to all interested people and the reports were distributed to them as a text. One of the important function of the meeting was that the members of the four committees could have a chance to discuss their activities with attendants. The activities of International Workshop on Industrial Computer Systems were also reported in the meeting and especially through the JEIDA report A-117.

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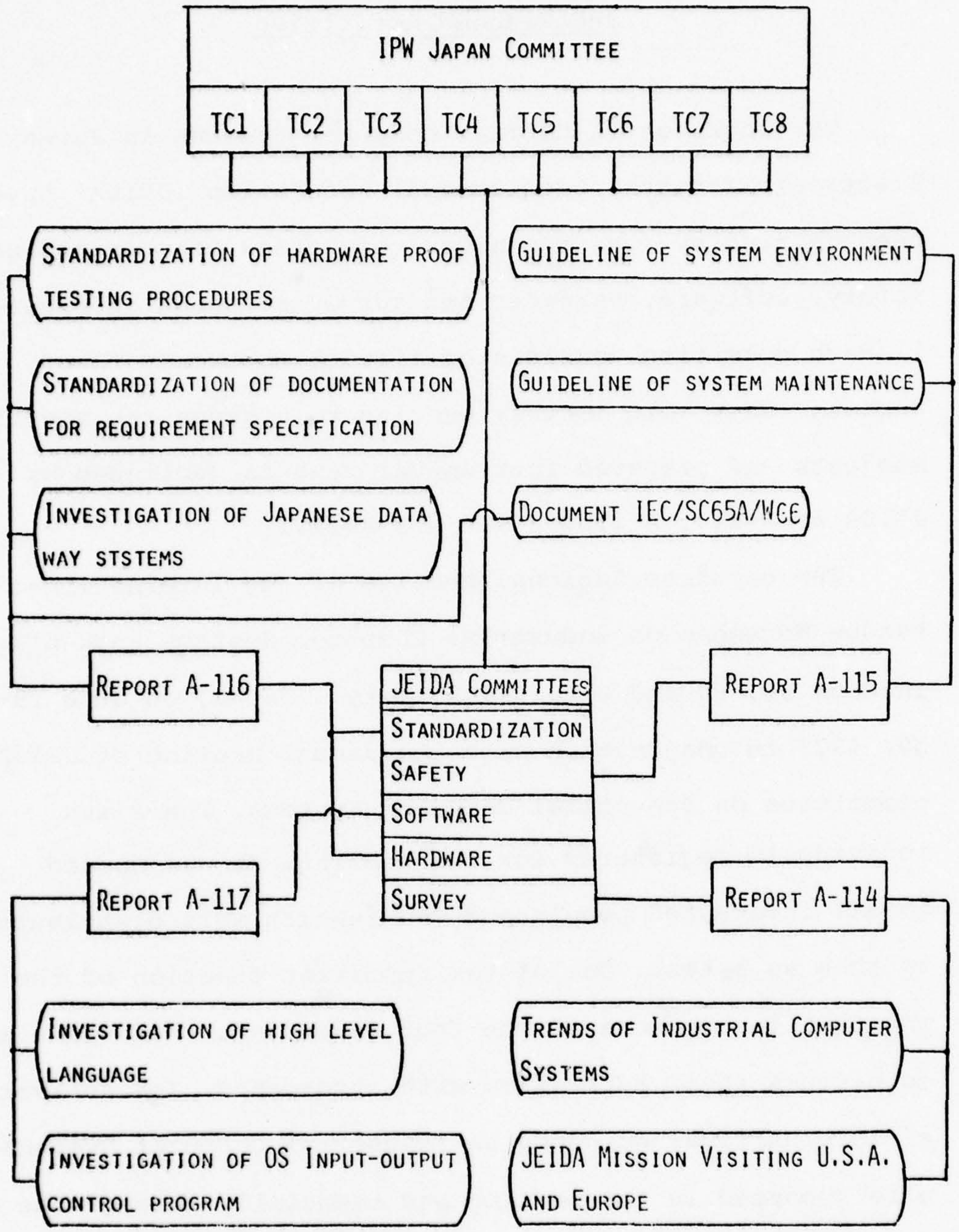

Figure 1. JEIDA activities on Industrial Computer Systems

INSERT III (Cont.)

Systems has been worked for standardization of hardware proof testing procedures as to the following components:

1) CPU
2) Auxiliary devices
3) Data input-output devices
4) Process input-output devices
5) Operator console
6) Power source

Cooperating with the Standardization Committee they are now planning to prepare a formal document to bring their result into the JEIDA standard.

2. <u>Standardization of Documentation for Requirement Specification</u>

To insure that the requirements of the users can be conveyed to the venders of software exactly, the Committee for Standardization of Industrial Computer Systems organized a Working Group on Standardization of Documentation Procedures for Software Requirement Specifications. They made a guideline of documentation procedures as to the following items:

1) Controlled plant
2) Function of the computer system
3) Position of the computer system in total system
4) Back-up systems
5) Process input and output
6) Process operator console

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INSERT III (Cont.)

7) Printing, logging and message

8) Data handling

9) File

10) Sequence control

11) Control loops

12) Control terms

13) Data communication

14) Background job

15) System performance

16) Program language

17) Application software

18) Schedule

They understand that their result is only a preliminary draft for standardization and are planning to distribute the draft to hear some comments of various users.

3. Investigation of Japanese Dataway Systems

The Sub-Committee for Hardware of Industrial Computer Systems investigated the formats and control procedures as to the following dataway systems,

F-Bus	Yokogawa	HDLC oriented
H-7480 DFW	Hitachi	
S-Type DHW	JSE	
MELCOM-LOOP	Mitsubishi	
RDAS-1000	Toshiba	

INSERT III (Cont.)

N6720 Model 2	NEC	PCM-24 oriented
FACOM 1880	Fujitsu	
TDCS-2000	Honeywell	
RINCS	Hokushin	
MPCS	Fuji Electric	

4. Document IEC/SC65A/WG6

Reffering the result of the investigation of Japanese dataway systems the Committees for Hardware and Standardization made joint work cooperating with IEC SC65A/WG6 (inter-subsystem communication) to prepare the proposed guideline for implementation of industrial process computer inter-subsystem communication (IEC/SC65A/WG6, Japan-2) which consists of following seven chapters:

1. Introduction
2. Application Environments
3. Functional Specification
4. Architecture
5. Protocol
6. Safety and Security
7. Maintenance

5. Guideline of System Environment

The Committee on the Safety, Security and Reliability of Computer Systems worked for guidelines of installation

INSERT III (Cont.)

surrounding and maintenance of industrial computer systems. The installation environments of the systems varies widely so that the obstacles caused by environment are increasing. One of the problems pointed out here is the lack of durability against environment of hardware, and the other is the lack of user's consideration about the installation environment. In order to solve these problems, the clarification of environmental condition on both sides of users and makers is considered necessary. The installation environment guideline was made as the first step.

They have a plan to continue the efforts and are going to revise the guideline hearing comments from various users.

6. Guideline of System Maintenance

The Committee on the Safety has a plan to prepare a guideline of system maintenance but, in the year of 1976, they only investigated the present status of the recommended system maintenance through questionnaire to twelve systems manufacturers and discussed the items which should be included the maintenance guideline. They will continue their effort to complete the guideline.

7. Investigation of High Level Languages

The Committee on Software investigated the recent developments of high level languages in Japanese computer systems manufacturers as to the following items:

INSERT III (Cont.)

1) Base language
2) Character number of Label and variables
3) Data type
4) Default interpretation
5) Alocation to the storage
6) Common variables among task
7) Virtual variable in external storage
8) Dimension of array
9) Data type Structure
10) Extensibility of the Languages
11) Operation on character string or bit string
12) Interrupt handling
13) Access to external storage
14) File-type
15) Input/Output of Typewriter and CRT
16) Statement for debagging
17) Real time facility
18) Process I/O access facility
19) Others

8. <u>Investigation of Operating Systems</u>

The Committee on Software investigated the present status of the operation systems as to the following items:

1) Tasking
2) Input/Output control program

INSERT III (Cont.)

3) File handling

4) Standardization of computers communication

and published the detail of following operating systems in JEIDA report A-117(1976):

Manufacturer	Computer system	Operating system
Toshiba	TOSBAC-40	POPS
Yamatake -Honeywell	HS 716	OP 716
Mitsubishi	MELCOM 350	TSOS
Pana Facom	Series U	UMOS
Hokushin	Hoc-900	OTOS 3
Yokogawa	YODIC 100	YOS-MD
Fuji Electric	Series U	POPS
Shinko Electric	SCCS	SOS
Nippon Electric	NEAC 3200/70	COM 32
Hitachi	HIDIC 80	TSES/PMS

They are going to make some standardization for operating system, at least, as to the concept and glossary.

9. Trends of Industrial Computer Systems

The committee for survey on industrial computer systems investigated the current state-of-art of industrial

INSERT III (Cont.)

computer systems in Japan and published detailed report through JEIDA report A-114. The report is the survey on the developments of system architecture, main frame, software and microcomputers. They are planning to make further investigation of standardized package of applications software.

Dr. Kohei Sato, Chief, Automatic Control Division, Electrotechnical Laboratory, will replace him. We are all acquainted with Dr. Sato since he has attended several of the Annual Meetings of the International Purdue Workshop and its predecessor groups.

We will miss Professor Terao's major contributions to the Workshop, particularly his shepherding of Purdue Japan. We wish to thank him most sincerely for his very great help and interest and wish him all good health and enjoyment in his retirement.

We welcome Dr. Sato as the new Chairman and look forward to working with him in all our future activities.

4. Mr. Johannes Reh

Another major loss has been the resignation of Mr. Johannes Reh as Chairman of the Long Term Procedural Languages Committee which he has served so effectively for many years. Insert IV reproduces his letter of resignation. I am sure all members of the workshop join in thanking Mr. Reh for his very great help to the Workshop in the past, particularly during the early years of LTPL and wish him every success in his ever increasing work with his company. We hope that sometime in the future he can once again join with us.

5. Standards Coordination

Insert V presents the report of the Vice Chairman for Standards Coordination, Dr. T. J. Harrison. As recorded there, standards activity remains high and the coordination task has in no way diminished in recent time.

6. Tutorials

A large number of tutorial presentations were made at this meeting of the Workshop as the result of the request of the members and also the work of several of the Technical Committees. Reprints of the slides and/or writeups of several of these are included in these Minutes at Appendices II-VII. In addition to those reproduced here, the following were also presented.

Lt. Col William A. Whitaker, Chairman, Higher Order Languages Working Group, U.S. Department of Defense presented a discussion entitled, "A Report on the Status and Future Program of the Higher Order Languages Working Group of the U.S. Department of Defense". This report was an updating of that published in the Minutes of the 1977 Spring Regional Meeting of the Workshop on pp. 657-666. Col. Whitaker requested the help of the LTPL Committee in further evaluations of IRONMAN and its successors and in review of the forthcoming proposals for languages from their current contractors.

Dr. Matthew Gordon-Clark chaired a tutorial Round Table discussion entitled, "Tasking-Past and Present". The Round Table was composed of himself and the following individuals:

Mr. Richard H. Caro
The Foxboro Company
Foxboro, Massachusetts

Professor Odd Petersen
Norwegian Institute of Technology
7034 Trondheim NTH, Norway

Mr. Alex J. Arthur
IBM Corporation
San Jose, California

INSERT IV

Johannes Reh, chairman of the LTPL-commitee

INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494 8425

Mr. Prof. Dr. T.J. Williams
c/o Purdue Laboratory for
applied industrial control
102 Michael Golden
Purdue University
West Lafayette
Indiana 47907
U S A

Please reply to:
Johannes Reh
c/o GPP Gesellschaft für
Prozeßrechnerprogram-
mierung mbH
Balanstr. 138/1
8000 München 90
Germany

Dear Prof. Dr. Williams,

after long internal considerations I must inform you that I am no longer able to act as chairman of the LTPL-commitee.

As you certainly remember, I am sharing the responsibilities for the General Management of GPP together with Dr. Eichenauer. The continuous growth of GPP is continuously demanding more and more of our available time. Due to my personal overload with work I have to resign from the LTPL-chairmanship and, unfortunately, cannot afford the time for a trip to Purdue this fall.

Please, explain my decision to my commitee fellows. Mr. Peter Elzer, with whom I am discussing possible alternatives for the LTPL work continuity, will also explain my decision at the workshop.

I feel very much obliged to thank my commitee collegues for their cooperation and I send my best wishes for the further LTPL and workshop work.

Very best regards

Johannes Reh

(Johannes Reh, Chairman of the LTPL-C.)

co. Mr. Peter Elzer

Affiliations:
Purdue University
Instrument Society of America through Data Handling and Computations, Chemical and Petroleum Industries, and Automatic Control Divisions
International Federation for Information Processing as Working Group, WG 5-4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology

International Purdue Workshop

IPW

Industrial Computer Systems

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

INSERT V

ANNUAL REPORT

VICE-CHAIRMAN FOR STANDARDS COORDINATION

DR. T. J. HARRISON

1977 OCTOBER 4

A BRIEF STATUS REPORT ON INTERNATIONAL STANDARDIZATION ACTIVITY, PRIMARILY IN THE AREAS OF LANGUAGES AND INTERFACES, WHICH ARE WITHIN THE SCOPE OF THE WORKSHOP

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TJH
77/09/26

Affiliations
Purdue University
Instrument Society of America through Data Handling and Computations, Chemical and Petroleum Industries, and Automatic Control Divisions
International Federation for Information Processing as Working Group WG5-4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology
Institute of Electrical and Electronic Engineering, Data Acquisition and Control Committee of the Computer Society, and Industrial Control Committee of the Industrial Application Society
International Federation of Automatic Control, Computer Committee
National Research Council of Canada, Associate Committee of Automatic Control
Commission of the European Communities (CEC) through its Directorate-General for Industrial and Technological Affairs
Japan Electronic Industry Development Association (JEIDA) through its IPW Japan Committee

INSERT V (CONT.)

STANDARD REPORT

REAL-TIME LANGUAGES

- o ACTIVE PROJECTS
  - INTERNATIONAL (ISO, PURDUE WORKSHOP) (FORTRAN, CORAL 66)
  - UNITED STATES (ANSI, DOD, ISA) (FORTRAN, PL/I, BASIC PASCAL-LIKE)
  - EUROPE (ECMA, EEC) (BASIC, LTPL)
  - UNITED KINGDOM (CORAL 66, RTL/2)
  - GERMANY (PEARL)
- o ISO/TC97/SC5
  - MEETING 1977 NOVEMBER, THE HAGUE
  - AGENDA: PLIP REPORT, PL/I, FORTRAN, ELEM. BASIC
  - NO KNOWN REAL-TIME ISSUES
- o ISO/TC97/SC5/WG1 (PLIP)
  - MEETING 1977 NOVEMBER, LONDON
  - FURTHER CONSIDERATION OF S61.1, DS61.2 FORTRAN EXT.
  - SHOULD CORAL 66 BE CONSIDERED?
- o PL/I
  - SUBSET/G - X3J1.3
    - FREIBURGHOUSE PROPOSAL
    - PROCESSING PROPOSALS
    - CHANGE CUT OFF WAS 77/9 MTG.
  - REAL-TIME EXTENSIONS - X3J1.4
    - CONSIDERING WORKING PAPER: DOCUMENT/T
    - PROCESSING PROPOSALS
    - AD HOC'S ON PARTICULAR STATEMENT

TJH
77/09/26

INSERT V (CONT.)

STANDARD REPORT

- ECMA & SC5 ACTIVITY
  - TC10 PROPOSAL: INTERACTIVE DATA TRANSMISSION
  - SC5 CONSIDER PL/I AT 1977 NOVEMBER MEETING

o BASIC

- ECMA/ANSI - IPW TC2 AGREEMENT
- ECMA/ANSI WORKING ON ENHANCEMENTS
- MINIMAL BASIC APPROVAL
  - ANSI (X3 APPROVED)
  - ECMA (TC21 APPROVED)
  - ON SC5 AGENDA: NNI-ANSI/ECMA
  - FIPS PLANNED

FORTRAN

- "FORTREV"
  - CONCURRENT X3-PUBLIC REVIEW CLOSED 77/9/15
  - SOME NEGATIVE VOTES
  - COMMENTS: 40% EXTENSIONS; 6% DELETIONS; 6% REVISIONS
  - SUBMITTED TO 97/5
- S61.1 ISA EXTENSIONS
  - SUBMITTED TO ANSI BSP.
  - ACCEPTED BY 97/5/1
- DS61.2 ISA EXTENSIONS
  - SUBMITTED TO 97/5/1
  - READY FOR ISA S&P
  - WILL SUBMIT TO ANSI
  - EXPECT ISA APPROVAL LATE 1977
- IPW-E DOCUMENT REVISED

TJH
77/09/26

INSERT V (CONT.)

STANDARD REPORT

- o EEC LTPL PROJECT
  - PROJECT LEADER NOT SELECTED
  - NO RECENT KNOWN PROGRESS
- o DoD HOLWG
  - EVALUATION COMPLETE
  - 4 SPECIFICATION CONTRACTS
    - CII-HONEYWELL-BULL
    - INTERMETRICS
    - SOFTECH
    - STANFORD RESEARCH INSTITUTE
  - ALL PASCAL-BASED
  - SPEC (INITIAL DESIGN) COMPLETE 1078 (PHASE 1 OF 3)
- o PEARL
  - PRE-STANDARDIZATION DISCUSSIONS IN DIN
  - FULL DESCRIPTION DUE SOON
- o CORAL 66
  - SUBMITTED TO 97/5/1 (NOT YET ACCEPTED)
  - BSI CONSIDERING (ALONG WITH RTL/2)

TJH

77/09/26

INSERT V (CONT.)

STANDARD REPORT

COMPUTER SYSTEM INTERFACES

- o ACTIVE PROJECTS
  - INTERNATIONAL (ISO, IEC, IPW)
  - UNITED STATES (ANSI, ISA, IEEE)
- o ISO/TC97/SC13
  - CHANNEL LEVEL PROPOSAL (JAPAN); CONVERT TO TR?
  - WG1: PROCESS-COMPUTER INTERFACES
    - DOCUMENT TECHNICALLY COMPLETE
  - WG2: ADMINISTRATION - INACTIVE
  - WG3: LOWER-LEVEL INTERFACES
    - PREPARING FUNCTIONAL REQUIREMENTS/APPLICATIONS
      - POINT-TO-POINT (FULL DUPLEX)
      - SMALL COMPUTER TO PERIPHERAL BUS
      - PROCESSOR SYSTEM BUS
- o IEC/TC65/SC65A/WG6: INDUSTRIAL INTER-SUBSYSTEM.......
  - DOCUMENT TECHNICALLY COMPLETE
  - START "CANDIDATE" EVALUATION
- o IEC/TC66/WG3: GPIB
  - BASIC STANDARD APPROVED
    - CONNECTOR BALLOT NOT REPORTED
  - CODE-FORMAT DOCUMENT TECHNICALLY COMPLETE
  - "MORE SERIAL" BEING CONSIDERED
  - 200M PROPOSAL REJECTED

TJH
77/09/26

INSERT V (CONT.)

- CAMAC
  - HAVE NOT HEARD MUCH LATELY
  - PROBABLY WILL BE ADOPTED AS ANS
- IPW - TC 5
  - TC5A
    - ADOPTED FUNC. REQ'TS (66/3)
    - STARTING EVALUATION
  - TC5E
    - HAS SPECIFICATION
- ANSI X3T9 I/O INTERFACES
  - X3T9.2 LOWER LEVEL
    - TWO SUBGROUPS
      - A = DEVICE INDEPENDENT
      - B = DEVICE DEPENDENT
    - NO SPECIFIC PROPOSALS
  - X3T9.3 DEVICE LEVEL
    - EXAMINED MODIFIED TAPE I/F
    - SEEKING OTHER CANDIDATES
      - DISK AND TAPE INTEREST
    - CHANNEL LEVEL (MAIN SC)
      - X3 BALLOT
      - FIPS PUBLISHED (76/12, 77/8)

TJH
77/09/26

INSERT V (CONT.)

OTHER ACTIVITY

- ISO/TC97/SC16
  - ESTABLISHED EARLY 1977
  - PROGRAM UNCLEAR
  - SCOPE: SEE ATTACHMENT

- ASTM E31 COMPUTERIZED LABORATORY SYSTEMS (CLS)
  - CONCURRENT ASTM/ANSI REVIEW OF GUIDELINES
    - E622: GENERIC GUIDELINES FOR CLS
    - E623: DEVELOPING FUNCTIONAL REQ'TS FOR CLS
    - E624: IMPLEMENTING CLS
    - E625: TRAINING USERS OF CLS
    - E626: EVALUATING CLS
    - E627: DOCUMENTING CLS
  - CONSIDERING SCOPE CHANGE: SEE ATTACHMENT

TJH
77/09/26

INSERT V (CONT.)

ISO/TC97/SC16

TITLE: OPEN SYSTEM INTERCONNECTION

SCOPE: INVESTIGATION OF THE NEED FOR STANDARDIZATION IN THE AREA OF OPEN SYSTEMS, AS IT RELATES TO SYSTEM INTERCONNECTION. THIS WILL INCLUDE THE STUDY OF THE STRUCTURE AND NATURE OF THE STANDARDS REQUIRED FOR EXCHANGE AND INTERCHANGE OF USER TASKS AND SYSTEM CONTROL AND STATUS INFORMATION. THIS WORK WILL TAKE INTO DUE ACCOUNT THE ACTIVITIES OF TC97/SC6 AND CCITT AND WILL BE BASED ON THE COOPERATION STATEMENT BETWEEN ISO AND CCITT.

PROGRAMME OF WORK

THE SUBCOMMITTEE WILL:

1. DEFINE TERMS OF PARTICULAR CONCERN TO THIS COMMITTEE.

2. PREPARE A SCHEMATIC MODEL FOR SYSTEM ARCHITECTURE FOR OPEN SYSTEM WORKING, IDENTIFYING AND SPECIFYING INTERFACES WHICH SHOULD BE CONSIDERED FOR STANDARDIZATION.

3. IDENTIFY THOSE INTERFACES FOR WHICH STANDARDS EXIST OR ARE UNDER DEVELOPMENT, OR ARE WITHIN THE SCOPE OF INTERNATIONAL STANDARDIZATION BODIES WITHIN OR OUTSIDE ISO.

4. PAY PARTICULAR ATTENTION TO LIAISON WITH THE BODIES CONCERNED WITH STANDARDIZATION RELATED TO ITS WORK, AND WILL RECOGNIZE AND USE STANDARDS PREPARED BY SUCH BODIES.

INSERT V (CONT.)

ISO/TC97/SC16

PROGRAMME OF WORK (CONTINUED)

5. PREPARE PROPOSALS FOR NEW WORK ITEMS FOR THE REMAINING INTERFACES FOR WHICH STANDARDIZATION IS NEEDED AND IS FEASIBLE.

6. DEVELOP STANDARDS FOR THOSE WORK ITEMS ASSIGNED TO IT.

NOTE: IT IS BELIEVED THAT THE LIAISON SHOULD AT LEAST INCLUDE THE FOLLOWING:

CCITT:	SC 7, 8, 17
TC97:	SC 5, 6, 14
TC95:	SC 68, 46, 154

INSERT V (CONT.)

PROPOSED E31 NAME AND SCOPE CHANGE

PRESENT SCOPE

THE PROMOTION OF KNOWLEDGE, STIMULATION OF RESEARCH, STANDARDIZATION OF NOMENCLATURE, AND RECOMMENDATION OF PROCEDURES AND PRACTICES FOR DEFINITION, IMPLEMENTATION, DOCUMENTATION, AND EVALUATION OF COMPUTERIZED LABORATORY SYSTEMS. THESE ACTIVITIES WILL BE COORDINATED WITH THOSE OF OTHER RELEVANT COMMITTEES OF ASTM AND OTHER ORGANIZATIONS.

PROPOSED SCOPE

THE PROMOTION OF KNOWLEDGE, STIMULATION OF RESEARCH, STANDARDIZATION OF NOMENCLATURE, AND RECOMMENDATION OF PROCEDURES AND PRACTICES FOR DEFINITION, IMPLEMENTATION, DOCUMENTATION, AND EVALUATION OF COMPUTERS AND COMPUTERIZED SYSTEMS. THESE ACTIVITIES WILL BE COORDINATED WITH THOSE OF OTHER RELEVANT COMMITTEES OF ASTM AND OTHER ORGANIZATIONS.

PRESENT COMMITTEE TITLE:

ASTM COMMITTEE E-31 ON COMPUTERIZED LABORATORY SYSTEMS

PROPOSED COMMITTEE TITLE:

ASTM COMMITTEE E-31 ON COMPUTERS AND COMPUTERIZED SYSTEMS.

TJH
77/09/26

Mr. Peter Elzer
University of Erlangen
Erlangen, Germany

Dr. Thierry Lalive d'Epinay
Eth
Zurich, Switzerland

The discussion was an explanation and coordination of the large amount of work on Tasking carried out by the Industrial Real-Time FORTRAN, the Long Term Procedural Language and the Operating Systems Committees and published extensively in the previous Minutes of the Workshop.

Some recent references other than those included in this present document are as follows:

(1) Caro, Richard H., "Draft ISA/X56.13A", Spring 1977 Minutes, pp. 144-148.

(2) "RT-FORTRAN, First Draft of the Purdue Europe Technical Committee on Industrial Real-Time FORTRAN", Spring 1977 Minutes, pp. 195-230.

(3) Petersen, Odd, "Management of Parallel Activities in Real-Time FORTRAN", Spring 1977 Minutes, pp. 231-274.

(4) Timmersfeld, K. H., "Status Report Tasking", Spring 1977 Minutes, pp. 337-344.

(5) Roberts, J. W., "On the American Redrafting of the Tasking Proposals", Spring 1977 Minutes, pp. 407-414.

(6) "Up to Date Report, TC-8", Spring Minutes pp. 533-572.

(7) Hands, Maxine, "Tasking", Fall 1976 Minutes, pp. 593-600.

(8) Curtis, R. L., "A Rationale and Proposal for FORTRAN Extensions for Task Management", Fall 1976 Minutes, pp. 603-621.

Mr. Thomas H. Lehman of the INTEL Corporation, Oak Brook, Illinois, presented a well illustrated lecture on "PL/M - A High Level Programming Language for Microprocessor Application". Mr. Lehman's remarks were well appreciated by the attendees who had many questions for him.

We wish to express our sincere thanks to all the tutorial speakers for a truly excellent set of presentations, all of which were very well received by all the attendees.

7. Man/Machine Communications

Included among the papers of the Technical Committee on Man/Machine Communications is a paper prepared by Messrs. R. R. Messare, J. H. Laroche and D. Shannon, all of units of the Exxon Company. We are very grateful to them and their separate companies for contributing this valuable work to the TC6 group and to the Workshop.

8. Reviews of Committee Activities

A major item of discussion during this meeting of the Workshop was a proposal entitled A Mechanism for Evaluating the Status and Need for Continued Existence of IPW Technical Committees (TCs). The proposal as passed by the Workshop is presented here as Insert VI.

INSERT VI

A MECHANISM FOR EVALUATING THE STATUS & NEED FOR CONTINUED EXISTENCE OF IPW TECHNICAL COMMITTEES (TCs)

Whereas:

1) The personnel available for TC membership is limited,

2) New topics of interest (such as Microcomputers) continue to appear in the application of Industrial Computers at a rate of one every 1 to 2 years,

3) A TC cannot normally work effectively without 10 active members,

Be it RESOLVED:

That the status of each TC will be reviewed by the International Meeting of IPW each 3 years. This review should produce one of five results:

R1) The TC's current scope and program are generally useful and should be continued.

R2) The TC's current program could be made more generally useful by modifying the TC's scope or emphasis. Specific suggestions for these modifications would be made.

R3) The work of the TC is no longer of general interest and it should be disbanded within 1 year. Its scope may be added to an existing TC.

R4) The scope of the TC should be divided. The divided scope could be added to an existing TC or a new TC could be formed.

R5) If a Committee's purpose, scope and emphasis are deemed worthwhile and consistent with the overall goals of the Workshop, recommendations should be made to the TC Chairman on ways of improving attendance.

The mechanism for conducting this review will be:

M1) Each TC will be reviewed at least every 3 years.

INSERT VI (Cont.)

M2) The Chairman of any TC, who suspects that a significant alteration of the TC's scope or termination of the TC is in order, may request an evaluation at the following International Meeting.

M3) If no such requests are received, the rotation will be based on TC attendance at the last two International and Regional Workshops and will be:

1978, 1981 - TC 9, TC 2, TC 4

1979, 1982 - TC 7, TC 8, TC 1

1980, 1983 - TC 3, TC 5, TC 6

M4) If any TC requests earlier evaluation, it will exchange places with the most active (measured by average attendance at the last 2 International Workshops) TC scheduled for evaluation that year.

M5) The Executive Committee may call for a review of the status of an inactive TC. This review will be in addition to those scheduled by the above rotation.

M6) The Chairman of each TC scheduled for evaluation will submit to each member of the Executive Committee by September 1 a report* containing:

6.1) The TC's current actual scope and areas of primary interest and activity.

6.2) A statement of the TC's specific accomplishments and the dates these were accomplished. Include the last 3 years only.

6.3) A summary of all International, Regional and TC meetings for the last 3 years including:

Dates, Location
Number of Attendees
Major Topics Discussed
Major Actions Taken

INSERT VI (Cont.)

6.4) The Chairman's proposed future program

6.5) The Chairman's recommendation on TC status

6.6) Copies of the specific accomplishments listed in 5.2

6.7) Other relevant material

*This report will be submitted at the International Meeting.

M7) The TC will present a tutorial outlining a significant phase of its work at the International Meeting.

M8) The Executive Committee will formulate a proposed resolution on that TC's status using one of the options (R1 - R5) outlined in this resolution.

M9) The Workshop will act on this motion. Amendments from the floor will be allowed.

Submitted by:

R. S. Crowder
Vice Chairman, Planning, IPW

10/4/77

INSERT VII

International Purdue Workshop

Industrial Computer Systems

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9. New Workshop Logo

Insert VII presents the new logo for the Workshop as proposed by Dr. T. J. Harrison, Chairman of the Ad Hoc Letterhead Committee. It is a development of those discussions in previous Workshops. The design was unanimously approved by the Workshop and Dr. Harrison was thanked for his efforts in preparing it. A copy of the resulting new letterhead is included here as Insert VIII.

10. Financial Report

Insert IX presents a copy of the Financial Report of the Workshop as the date of the present meeting. Costs still run higher than meeting attendance fee and Minutes sales income. However, the Executive Committee is very reluctant to raise attendance fees and the prices of individual Minutes.

11. Grant from Naval Air Systems Command, U. S. Navy

We are very pleased to report that the Naval Air Systems Command, U.S. Navy has made a grant of $15,217.00 for the period of December 1, 1977 to November 30, 1978 to Purdue University for support of the International Purdue Workshop on Industrial Computer Systems. The grant, which was made through the Office of Naval Research, will provide funds for publication of Workshop Minutes and relieve the problem discussed in Item 10 above. It will also provide funds for the Workshop General Chairman to attend the Regional Meetings of the Workshop on an alternate basis. We wish to thank the U. S. Navy most sincerely for their interest in and help to the Workshop.

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12. Cooperation with DoD-HOL Working Group

Insert X presents the wording of a Motion passed by the Workshop requesting a statement of formal cooperation from the Higher Level Languages Working Group of the Department of Defense and a letter of transmittal of this motion to Lt. Colonel William A. Whitaker, Chairman of the Working Group. This Motion was necessary due to the varied wording of the two Motions passed last Spring by Purdue Europe and Purdue Americas (see the Minutes 1977 Spring Meeting).

13. Microprocessor Committee

Concern among the Workshop Members for the place of the microprocessor in future industrial computer systems resulted in the developed presentation and approval of the following motion:

> "That the Workshop establish an ad-hoc Committee to recommend to the Workshop how the Workshop and its Technical Committees should include the influence of microprocessors/microcomputers in its deliberations. Such a recommendation could include directions to existing committees and/or the establishment of a new committee and the definition of the scope of such new committee."

Mr. Yoel Keiles
Honeywell. Inc.
1100 Virginia Dr.
Ft. Washington, PA 19034
(215) 643-1300

was appointed Chairman of this Committee.

International Purdue Workshop
IPW
Industrial Computer Systems

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

Affiliations
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International Federation for Information Processing as Working Group WG5-4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology
Institute of Electrical and Electronic Engineering, Data Acquisition and Control Committee of the Computer Society, and Industrial Control Committee of the Industrial Application Society
International Federation of Automatic Control, Computer Committee
National Research Council of Canada, Associate Committee of Automatic Control
Commission of the European Communities (CEC) through its Directorate-General for Industrial and Technological Affairs
Japan Electronic Industry Development Association (JEIDA) through its IPW Japan Committee

INSERT IX

INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

WORKSHOP FISCAL REPORT

1 NOVEMBER 1976 - 30 SEPTEMBER 1977

I. Receipts			
A. Attendance Fees			*$ 6,080.00
B. Sales			
1. Minutes, International Purdue Workshop on Industrial Computer Systems		$3099.85	
Accounts Receivable		(876.12)	
2. Software Minutes		1060.00	
Accounts Receivable		(30.00)	
3. Hardware Minutes		218.00	
4. Alcoa Decks		-0-	
5. Manufacturing Languages and Software Systems Minutes		60.00	
Accounts Receivable		(30.00)	
	Subtotal		4,437.85 (936.12)
C. DACHOD Grant			250.00
(1977 Payment not yet received)			250.00
D. IFIP WG 5.4 Reimbursement (Received)			397.80
E. IFIP WG 5.4 Reimbursement (Expected)			682.50
F. Conference Reimbursement 4th Annual Meeting			1,347.83
	TOTAL RECEIPTS		$12,509.86
II. Costs			
A. Printing			
1. Announcements		853.61	
2. Minutes International Purdue Workshop on Industrial Computer Systems		5297.83	

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INSERT IX (Cont.)

II. Costs (continued)

3. Guidelines Revision	550.59	
4. Letterhead for International Purdue Workshop	177.09	
5. Duplicating Expense (Other)		
TC 7 Brochure	101.84	
ARPANET copies	100.59	
IRONMAN copies	91.24	
Bylaws copies	13.42	
Mailing List Update letter	13.66	
Subtotal		7,199.87
B. Mailing Costs		
1. Announcements	1041.95	
2. Minutes (To Workshop Attendees & Chairmen of Committees	67.70	
3. Spring Summary Mailing	75.20	
4. Miscellaneous Postage	383.56	
Subtotal		1,568.41
C. **Workshop Meeting Costs		2,984.00
D. Secretarial		2,200.00
E. Telephone, Telegrams, etc.		65.00
TOTAL COSTS		$14,017.28
III. Net Loss		(1,507.42)
IV. ***Losses Brought Forward		$(23,297.07)
V. Total Loss		$(24,804.49)

INSERT IX (Cont.)

*Attendance Fees include the Workshop on Manufacturing Languages and Software Systems.

**Workshop Meeting Costs, likewise, include the Workshop on Manufacturing Languages and Software Systems.

***Losses Brought Forward reflect a corrected report resulting from Conference remittances to the Workshop for the 2nd and 3rd American Regional and Annual Meetings in the Amount of $5038. Remittance for the 4th Regional Meeting will be reflected in the next fiscal report since that figure has not yet appeared on the books. Also included is a $400 remittance for the Workshop on Manufacturing Languages and Software Systems. This accounts for a total on cost recovery of $5438.

NOTE: The Purdue Laboratory for Applied Industrial Control has completed the work for Contract Number N00014-76-C-0732 from the Office of Naval Research and has expended the sum of the Grant which was $27,800.

This work covered the reprint of the LTPL-E Language Comparison Study, as well as providing an Index to the Minutes of the Inter'l Purdue Workshop, a composite descriptive document of the Workshop (Report No. 77), and a collection of the major definitive documents of the Workshop in six parts.

These publications are available upon request.

INSERT X

International Purdue Workshop
IPW
Industrial Computer Systems

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

Above

November 4, 1977

Lt. Col. William A. Whitaker, Chairman
DOD-HOL Working Group
Defense Advanced Research Projects Agency
1400 Wilson Blvd.
Arlington, Virginia 22209

Dear Colonel Whittaker:

As a follow-up to my letter of June 27, 1977, I am happy to transmit officially to you a Resolution passed by the Fifth International Meeting of the International Purdue Workshop on Industrial Computer Systems on Tuesday, October 4, 1977. We are happy that you could be with us on that occasion and hear for yourself the sentiments of our group concerning the intent of this Resolution and our sincere desire to continue, as in the past, the excellent cooperation between our two groups as called for in the Resolution. The Resolution as passed is given in Attachment I.

As you know our European Regional Organization passed the form of this Resolution given in Attachment II at their Meeting at Ispra in Italy, on March 31, 1977. It is identical to the other except for the Addendum calling for action to be originated by the American Regional Organization of the Workshop. In response to this request from their European colleagues, the latter region passed a different Resolution on April 21, 1977 (Attachment III) which was transmitted to you with my letter of June 27, 1977.

Because of the difference in wording of the two Resolutions, we felt it necessary to pass the original Resolution in the International Meeting hence our action on October 4.

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INSERT X (Cont.)

Lt. Col. William A. Whitaker
November 4, 1977
Page Two

As I stated in my previous letter and also above, we of the Workshop are very appreciative of the cooperation which has taken place between your DOD-HOL Working Group and our LTPL Committee, particularly its American and European Branches, LTPL-A and LTPL-E. We hope very much that this can continue. The purpose of our Resolution therefore is to start any necessary procedures involved in putting such cooperation on an official basis so that it will be sure to occur regardless of any change in personnel assignment, etc., on either side.

We look forward to hearing from you concerning this and to seeing you at our future meetings. Thank you very much for your consideration.

Best wishes.

Sincerely,

Theodore J. Williams

Theodore J. Williams
General Chairman

TJW:mrw

Encl. (3)

cc: Mr. Barry DeRoze
Mr. James S. Campbell
Dr. Walter Beam
Mr. W. E. Vannah
Mr. W. G. Madison
Mr. D. L. Shoemaker
Mr. A. P. McCauley
Mr. B. A. Zempolich
Mr. J. F. Auwaerter
Mr. A. Lai
Mr. R. G. Hand
Mr. R. M. Brown
Mr. J. E. Peyton
American Region Executive Committee
European Region Executive Committee
International Executive Committee

INSERT X (Cont.)

ATTACHMENT I

COOPERATION BETWEEN THE
HIGHER ORDER LANGUAGES WORKING GROUP-DEPARTMENT OF DEFENSE
AND THE
INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

RESOLVED: That in the interest of fostering the development and standardization of higher level languages for use with real-time, on-line, sensor-based computer systems, the international Purdue Workshop on Industrial Computer Systems through its International organization and its Regional Branches reiterates its desires to cooperate fully with the Higher Order Languages Working Group of the Department of Defense of the United States (HOL-DOD) in the development of such a language.

The Workshop participants request a similar formal expression of cooperation on the part of the HOL-DOD Working Group. This is to facilitate the establishment of the mechanisms for implementing the necessary coordination of the work of the two groups. It is necessary because of the several governmental and international bodies who supply funding for the several individuals and groups who will be involved in this cooperative effort.

The cooperative work discussed here will be carried out mainly by the Long Term Procedural Language Committee (LTPL-C)

INSERT X (Cont.)

ATTACHMENT I (Cont.)

of the Workshop and its three regional branches, LTPL-A, LTPL-E, and LTPL-J for America, Europe, and Japan respectively. Other committees of the Workshop will be involved also.

Passed by the Fifth International Meeting of the International Purdue Workshop on Industrial Computer Systems, October 4, 1977, Purdue University, West Lafayette, Indiana.

14. Elections

Mr. Richard H. Caro as Chairman of the American Region served as Chairman of the Nominations Committee. He was joined by Mr. Nicolas Malagardis, Chairman, Purdue Europe, and Professor Mitsuru Terao, Chairman, Purdue Japan. The proposed slate, unanimously elected, was as follows:

TC 1, Chairman, FORTRAN Committee

Dr. Matthew Gordon-Clark
Scientific Associate
Technology Center
Scott Paper Company
Scott Plaza No. 3
Philadelphia, PA 19113

TC 2, Chairman, Industrial BASIC Committee

Professor Gordon Bull
Dartmouth College
Krewit Computation Center
Hanover, NH 03755

TC 3, Chairman, Long Term Procedural Languages Committee

Dr. Merritt E. Adams
Dept. 7103
Western Electric Company
4513 Western Avenue
Lisle, IL 60532

TC 4, Chairman, Problem-Oriented Languages Committee

Dr. Hans Windauer
Mathematischer Beratungs und
Programmierungsdienst GMBH -
Semerteichstr. 47
4600 Dortmund
FEDERAL REPUBLIC OF GERMANY

TC 5, Chairman, Interfaces and Data Transmission Committee

Dr. R. Warren Gellie
Control Systems Lab Bldg. M 3
National Research Council/Canada
Montreal Road
Ottawa, Ontario
CANADA KIA OR6

TC 6, Chairman Man/Machine Communications Committee

Mr. Robert F. Carroll
Manager, Systems Engineering
B. F. Goodrich Chemical Company
6100 Oak Tree Boulevard
Cleveland, Ohio 44131

TC 7, Chairman, System Reliability, Safety and Security Committee

Mr. Roy W. Yunker
Director, Process Control
PPG Industries
#1 Gateway Bldg.
Pittsburgh, PA 15222

TC 8, Chairman, Real-Time Operating Systems Committee

Dr. Thierry Lalive d"Epinay
Hybridrechnenzentrum de ETH
Voltastrasse 18
CH-8044 Zurich
SWITZERLAND

Vice Chairman for Planning

Mr. Robert S. Crowder, Jr.
Senior Engineering Associate
Engineering Physics Laboratory - Bldg. 357
E. I. duPont deNemours & Co.
Wilmington, DE 19898

Vice Chairman for Standards Coordination

Dr. Thomas J. Harrison
Senior Engineer
General Systems Division
IBM Corporation 22B031
P. O. Box 1328
Boca Raton, FL 33432

General Chairman

Dr. Theodore J. Williams
Purdue Laboratory for Applied
Industrial Control
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907

15. <u>Future Meetings</u>

The Spring Regional Meeting of the International Purdue Workshop on Industrial Computer Systems will take place as follows:

Purdue Europe

April 4-7, 1978 (4 days)

ETH, Zurich, Switzerland

Purdue Americas

April 10-12, 1978 (3 days)

Purdue University

West Lafayette, Indiana

Purdue Japan

End of June - First of July, 1978

JEIDA

Tokyo, Japan

The Sixth Annual Meeting will take place as follows:

October 9-12, 1978 (4 days)

Purdue University

West Lafayette, Indiana USA

CHAPTER II

REPORTS OF THE INDUSTRIAL REAL-TIME FORTRAN COMMITTEE

The following documents are included here:

1. Minutes of the Meetings of October 3-6 of TC1-C.
2. Correspondence between M. Gordon-Clark and G. Heller re collaboration of TC1-A and TC1-E.

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INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

NOV - 3 1977

Please reply to:

October 14, 1977
Scott Paper Company
Scott Plaza III
Philadelphia, Pa. 19113

Minutes of the Joint Meeting of the International Purdue Workshop FORTRAN Committee (TC1) and ISA SP61 Committee on Industrial FORTRAN held at Purdue University, West Lafayette, Indiana, October 3rd to 6th, 1977.

The following were present:

Matthew R. Gordon-Clark - Scott Paper (Chairman)
Kamal Bitas - Modcomp
Richard Caro - Foxboro
Nicholas Malagardis - IRIA France
Odd Pettersen - Norwegian Institute of Technology, Norway
Mary Pickens - General Motors
Gaston Thibaut - Alcan, Canada
Edward Wilkens - Interdata

Apologies for absence were received from Rick Signor, Maxine Hands, and Guenter Heller (Chairman of ICI-E).

The agenda was agreed upon as follows:

S61-1 - 1976
S61-2 - 1977
ANSI X3J3 FORTRAN/77
ISO/IC97/SC5/WG1
Report on Activities of TCI-A
Report on Activities of TC1-E

There was no report on TC1-J activities as there was no Japanese member present.

S61-1- 1976

Matthew Gordon-Clark reported that ISA S61-1-1976 had been sumitted to ANSI for approval as an American National Standard. The only comments which were procedural rather than technical, had been resolved and it was likely to be approved by ANSI in the near future.

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Affiliations:
Purdue University
Instrument Society of America through Data Handling and Computations, Chemical and Petroleum Industries, and Automatic Control Divisions
International Federation for Information Processing as Working Group, WG 5.4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology

Minutes of Meeting
October 14, 1977
Page 2

Draft S61-2-1977

Matthew Gordon-Clark reported that this document had not yet been sent out by the ISA Standards and Practices Board for a letter ballot because the Board had asked for additional documentation. It was expected that a approval would come before the end of the year.

ANSI X3J3 FORTRAN/77

Richard Caro reported that the FORTRAN/77 document had been submitted to ANSI for approval as a standard and is expected to become ANS X3.9-1977, replacing X3.9-1966. X3.10-1966 (Basic FORTRAN) will be dropped but included in X3.9-1977 is a FORTRAN subset. In addition, FORTRAN/77 will be presented to ISO/TC97/SC5 to become an ISO standard replacing ISO R1539-1972.

Rick Signor was not present because he was attending the X3J3 meeting to consider extensions to FORTRAN in areas such as process control, typesetting, numerical control, time sharing, and data base management.

ISO/TC97/SC5/WG1 (PL1P)

Matthew Gordon-Clark reported on the recent papers on FORTRAN from AFNOR which consisted of additional areas for FORTRAN standardization. It was possible that the PL1P meeting in London will recommend that ISA S61-1-1976 and draft ISA S61-2-1977 be sent to SC5 for a vote to become ISO standards.

Activities of TC1-A

The TC1-A committee has met in San Jose in January 1977, Purdue in April 1977 and Foxboro in June 1977. The San Jose meeting was devoted to answering the comments on draft S61-2-1977. The other meetings were concerned with tasking and the choice of features for inclusions in S61-3. A preliminary draft document was prepared for the committee for the International meeting at Purdue.

Activities of TC1-E

The TC1-E committee has met in Brussels in January and in August and in Ispra, Italy in March 1977. In these meetings the committee had developed and refined a document describing industrial FORTRAN in its totality. This document is a superset of S61.1-1976, draft S61-2-1977 and the preliminary ideas on S61-3.

Minutes of Meeting
October 14, 1977
Page 3

S61-3 Proposals

The majority of the committee's time was spent in defining the technical contents of S61-3. Two documents were studied in detail - TC1-E FORTRAN section 2 (called E below) and draft S61-3 by Richard Caro and Matthew Gordon-Clark (called A below) to determine significant differences. The following differences in terminology and intent were found:

1. The STOP transition was inadvertently left off the state diagram in A, also page 1 of A on scope was not included in the copies distributed to committee members.

2. The terms "task" in A was not the same as "activity" in E. A task in A existed only as long as its virtual processor existed so that several independent (non-cyclic) invocations of an executable program would constitute different tasks. In the E document these executions would constitue a single activity.

3. Document A does not include the KILL and CREATE calls in document E. In document E, these calls do not imply linking,but are used to associate an activity name to an executable program.

4. Document A has a generalized initiation call - SKED - All document E calls are special cases of SKED and it was expected that all calls in E would be explicitly defined in later versions of A. Similar comment applies to DSKED and DELAY.

5. The term "event mark" in document A was thought of as a mechanism for describing process interrupts as they are typically used in process programs for such purposes as task activation, task resumption and for counting purposes.

6. The term "semaphore" in document E was intended to provide a mechanism for a programmer to be able to construct critical regions, control the sharing of resources, and the interrelationship between cooperating activities.

7. Definitions need to be improved in both documents. Among the terms that need good definitions are executable program, event mark, activity and task. It is necessary to check existing glossaries to ensure that definitions do not depart from existing standards.

8. Both documents did not consider the problems of critical regions or inter-task communication. The former can not be solved in any adequate manner without a BLOCK structure, and the latter can be done by files and read/write using S61-2. Also general exception handling cannot be provided consistent with the rules of FORTRAN.

Minutes of Meeting
October 14, 1977
Page 4

The committee investigated the similarities and differences between the event mark and the semaphore. It was established that the two desired results could be achieved by one concept called an event mark with the following functions and properties:

Event mark is a non-negative integer.

SETEM	increments an event mark by one
CLREM	decrements an event mark by one
TESTEM	a Boolean function, true if the event mark is non-zero false if zero.
PRESEM	sets an event mark to any positive integer
RDSEM	reads the positive integer value of an event mark.

In the functions of SKED, DSKED, DELAY, if an event mark is used to initiate the function, the event mark would be automatically decremented.

The changes to document A are the addition of PRESEM and RDSEM, and the necessity for automatically decrementing the event mark in SKED, DSKED, DELAY.

The semaphore functions in document E are performed as follows:

SIGNAL	by SETEM
WAITS	by DELAY with S=3 (or S=4 which provides a time out to avoid dead lock)
AWAIT	by DELAY

provided the "j" parameter was made equal to 1. This restriction was considered reasonable as the possibility of "j" being different than one was only a recent addition to document E. Odd Pettersen agreed to discuss this point with TC1-E. If it is desired to test an event mark to determine its value (such a test may be desired if an event mark is used to control a message buffer) this can be achieved as follows:

```
If (RDSEM(I).LT. VAL) THEN ........
```

This unified description was considered to be most satisfactory as it provided capability both for the process engineer in terms he could understand as interrupts and for the system designer who required a semaphore for system control.

General Considerations

Matthew Gordon-Clark, Nick Malagardis and Odd Pettersen discussed the possible mechanisms for TC1-E to persue the standardization of the new ideas included in TC1-E FORTRAN document especially in areas of process input/output, date and time, and files. It was agreed that TC1-A, though its alter ego

SP61, would develop a tasking standard S61-3. TC1-E could make its additions into an S61-4 for standardization by a European committee through ISA (Tom Harrison can see no reason for this not to work but it would be most unusual); it could apply directly to the ISO via TC97/SC5/W61; it could go to a European national standards body; or it could use some route through the CEC in Brussels. It was agreed that a procedure for standardization of work developed by the IPW in Europe must be developed. Nick Malagardis will recommend an approach.

IRONMAN

The committee met in joint session with the LTPL committee to consider further work on the DoD IRONMAN document. It was decided to provide a list of relevant papers from all sources. LTPL-E, LTPL-A and FORTRAN committee were asked to provide copies of these documents together with a brief explanation of their contents and relevance to IRONMAN by the joint meeting with LTPL-A scheduled for San Diego in January. It is important that these documents be ready by that date if the IPW wishes to influence the DoD choice of contractors for the next phase of their project.

Presentation

A presentation on tasking was made to the entire workshop by

Matthew Gordon-Clark, Richard Caro and Odd Pettersen of TC1
Peter Elzer and Alex Arthur of TC3
Thierry Lalive D'Epinay of TC8.

This discussion on the total tasking effort of the IPW was well received and all the presenters are thanked for their efforts.

Also the present position of the FORTRAN work on tasking was discussed with the LTPL committee. The LTPL committee agreed to provide the FORTRAN committee with a copy of their document on tasking as soon as it was ready.

Actions

The following actions were assigned:

Complete submission of S61-2-1977 - Matthew Gordon-Clark

Report to TC-1-E on decisions on S61-3 and indicate agreement or disagreement - Odd Pettersen

Put S61-3 corrected on word processing system and issue revised document - Richard Caro

Propose mechanism for IPW-E standardization - Nicholas Malagardis

Prepare comments and examples for S61-3 - All

Provide new or better definitions for S61-3 - All

Collect FORTRAN documents for IRONMAN review - Matthew Gordon-Clark

<u>Future Meetings</u>

TC1-A/ISA SP61	Santa Ana	January 3rd, 1978
	San Diego (jointly with LTPL-A)	January 4th/5th, 1978
	Purdue	April 11th-13th, 1978
	Philadelphia	May/June 1978
TC1-E	Brussels	January 3rd-5th, 1978
	Zurich	April 3rd-6th, 1978

Matthew R. Gordon-Clark

Matthew R. Gordon-Clark
Chairman of IPW FORTRAN Committee (TC1)
and ISA SP61 Committee

INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
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West Lafayette, Indiana 47907, USA
317/494-8425

Purdue Europe TC 1 on Industrial Real-Time FORTRAN

PE TC 1, 11/77

Please reply to:

Prof. Dr. G. Heller
FHT Mannheim
Speyerer Strasse 4
D 68 Mannheim 1

Prof. Dr. Th. J. Williams
Chairman of the International Purdue Workshop

Dr. Th. J. Harrison
Vice Chairman for Standards of the
International Purdue Workshop

Mr. M. R. Gordon-Clark
Chairman of the International and the
American FORTRAN Committee

Sept. 6, 1977

<u>Concern</u>: 5th International meeting of the International Purdue Workshop, Oct. 3 - 6, 1977.
Paper S61-3 on tasking in RT-FORTRAN.

Gentlemen:

Many thanks for the announcement and agenda of the IPW meeting, which I received today. I regret very much not being able to attend the IPW meeting this year. Therefore I have to make my comments by a letter.

Let me first cite the announcement and agenda of the meeting, pages 10 and 11:

"The FORTRAN Committee (TC-1) will devote most of its time to consideration of S61-3. In particular, the complete <u>technical</u> contents of this document will be decided on at this meeting. The details of the actual document will not be decided at the meeting but no new ideas or features will be included after this meeting. .... Any ideas submitted to the committee after this meeting will be deferred until another standard is developed or until the current standards are reviewed (this occurs every five (5) years).

....

IF YOU WISH TO INFLUENCE THE CONTENTS OF THE FORTRAN STANDARD ON TASKING, BE SURE TO COME TO THIS MEETING.

THIS IS YOUR LAST CHANCE."

The paper S61-3 to be decided on has not yet been received by our committee. We have only got from Mr. Gordon-Clark two papers referring to S61-3:

(1) A proposal of Mr. Caro to S61-3 of April 13, 1977 and

(2) a short table of contents of the intended paper S61-3 in the minutes of June 22, 1977.

In (1) four calls for the tasking are proposed, which are completely different from the calls for tasking already standardized in S61-1. The table of contents mentioned above show that the paper (1) refers to a part of S61-3 only. Besides from the more inofficial paper (1) of Mr. Caro to the present official paper S61-3 there have been two meetings of the American committee in between. Thus our committee has nothing but vague ideas what might be the technical content of S61-3.

I'm sorry to say the following: Our committee cannot agree to fix the technical contents of the standard S61-3 at the IPW meeting as we do not know this standard at present and did not have the chance to discuss it and eventually to recommend improvements.

I therefore propose the following motion:

The International Purdue Workshop may not decide at its 5th meeting on the technical contents of S61-3.

If this motion cannot be accepted for any reason I ask Dr. Harrison, Vice Chairman for Standards, to support our aim in accordance with article VI, section 2, point b, of the bylaws as the technical contents of S61-3 are not adequately reviewed by all who are substantially concerned.

Yours sincerely

G. Heller.

Chairman of Purdue Europe
TC 1 on Industrial Real-Time
FORTRAN

Ø Mr. K. Thompson, CEC
Mr. N. Malagardis, Chairman of Purdue Europe
All chairmen of the Purdue Europe technical committees
Members of Purdue Europe TC 1

INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to SEP 27 1977

SCOTT PAPER COMPANY
Scott Plaza III
Philadelphia, Pa. 19113

September 21, 1977

Professor G. Heller
FHT Mannheim
Speyerer Strauss 4
D 68 Mannheim
West Germany

Dear Professor Heller:

Thank you very much for your letter of September 6, 1977. I believe we have a misunderstanding of the term "technical contents" used in my notice of the agenda for the FORTRAN Committee Meeting of the International Purdue Workshop and I assure you there is no intent to force a standard into existence without widespread public review; indeed the appropriate standards management boards, such as ISA Standards and Practices Board, will not approve any document without a public review.

The term "technical content" was used to distinguish the actual technical scope of a standard from the detailed description and accurate wording of the standard. This definition of the technical scope is necessary so that attention can be given to the actual writing of the standard. Certainly new ideas may arise after the technical contents have been defined but to ensure that standards are written in reasonable time such new ideas are postponed until the next revision or the next addition to the standard. As an example the new ANSI FORTRAN does not include a bit data type and the committee did not deny the usefulness of such a concept, but the committee had made a decision to exclude bit data types from the technical content of the standard. If such action is not taken, the detailed description and writing of a standard will never begin.

Professor G. Heller
September 21, 1977
Page 2.

As far as S61-3 is concerned, the central technical contents are not the details of the tasking calls -- I agree that the papers of Dick Caro are only preliminary ideas and in no way represent a finished standard, indeed the definitions in the IPW Europe document are more complete -- but whether the subject of critical regions and of inter-task communication of data be included, and whether the system features in KILL and CREATE should be included. When a decision is taken on the technical content of S61-3, the detailed description of the required subroutines and their associated parameters can begin. It is my intent to resolve these issues in October at Purdue.

The actual standard document will take several meetings to prepare. My earliest date for a document which I could ask ISA to distribute for public review is July 1978, which is after three more Committee Meetings (San Diego in January, Purdue in April, one on the East Coast probably Philadelphia in June). This could easily be an optimistic schedule. I also anticipate extensive comments on this first public review and a significant rewrite of the document.

There will be technical items that could be included in Industrial FORTRAN that will be not in S61-1, S61-2, S61-3. The French standards organization, AFNOR, has submitted an interesting paper on extensions to FORTRAN for industrial purposes to the working group of the ISO (ISO/TC97/SC5/WG-1) and have been requested to present proposals on these ideas as a standard. When the technical content of S61-3 is established, members of the FORTRAN Committee of the IPW may wish to embark on the development of additional features in parallel with the actual writing of S61-3 as occurred with the development of S61-3 while S61-2 was being written. This method of proceeding produces standards on the agreed technical areas as soon as possible and does not delay such areas while other more contentious issues are resolved. If S61-1 had waited for a full solution of the problem of tasking calls, rather than include the known requirements of START, TRNON, and WAIT, the S61-1 document would not exist as a standard today.

I hope this letter shows you that the intent of agreeing on the "technical content" of S61-3 at the International Meeting of the IPW in October is to provide a firm base to write the standard, and that all the regular review procedures required for standards will be carried out as usual. There was no intent to avoid such reviews and there was no belief on my part that any of the existing documents on S61-3 are ready for such review.

Yours truly,

Matthew R. Gordon-Clark
Chairman IPW FORTRAN Committee (TC 1)
Chairman ISA SP61 Committee

CC: Dr. T. J. Harrison - I.B.M.
Dr. T. J. Williams - Purdue

CHAPTER III

REPORTS OF THE
INDUSTRIAL REAL-TIME BASIC COMMITTEE

The following documents are included here:

1. Report of the Meeting of TC2-C on October 3-6, 1977.
2. Report of the Activities of TC2-E since the Fourth International Workshop.
3. Real-Time Basic, Report of the Activities of TC2-J since the Last Workshop.
4. Proposal of the Real Time BASIC Committee (IRTB-E/77-17).
5. Letter from Mr. Koji Yoda re IRTB-E/77-17 (Level 1 IRTB).

REPORT OF MEETING OF TC2 (BASIC)

at Purdue 3-6 Oct. 77

Present: G. M. Bull (TC2 Europe), Chairman
K. Yada (TC2 Japan)
W. Frakes (TC2 USA)

1. The document (IRTB-E 14/77) describing the cooperation between ANSI X3J2, ECMA TC21 and Purdue TC2 was agreed.

2. Reports of activities in Japan and Europe were accepted.

3. Document IRTB-E 17/77 (Level 1 Industrial Real-Time BASIC) was discussed fully and nearly 20 comments prepared for transmission to TC2 Europe. The comments addressed errors, responded to open questions, and suggested changes.

4. Document IRTB-E 20/77 (Level 1 Debugging) was discussed fully and comments prepared for transmission to TC2 Europe.

5. Document IRTB-E 18/77 (Level 2 Industrial Real-Time BASIC) was discussed briefly and comments prepared for transmission to TC2 Europe.

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Report on the Activities of TC-2E (Industrial Real Time BASIC) of the International Purdue Workshop for the period fall 1976 to fall 1977

1. State of the overall organization

During the period to be reported on all three regional committees have been active; however, at this time, the majority of the work has been done by the European committee whilst the American and Japanese committees have been establishing themselves.

The European group is fortunate since it has achieved full cooperation between about 20 members based in research, manufacturing and user companies; in America there have been some problems probably due to commercial confidentiality.

The European group has had four meetings and has also organized a Process Control Computer Workshop in Budapest.

During the course of working on the standards members of the committee have attended meetings of several other standards Institutions (ANSI, ECMA, BSI and DIN).

2. Achievements of the Committee

The European group has produced approximately twenty-five working papers which habe also been distributed to America and Japan from whom comments have been received. These papers reflect the three main interests of the group namely: Discussions on the principal features of Real Time Programming, evaluation of the needs of users of industrial RTB systems and, most important, the work on a proposal for a standard for Real Time BASIC.

At this time, the results of the questionaire, distributed to various IRTB users, are available; the Standard proposal for IRTB, which will also be distributed to both ANSI and ECMA will be available in November, 1977.

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An official co-operation has been established between ANSI - X3J2, ECMA-TC21 and TC2 of the International Purdue Workshop. In this co-operation TC2 is responsible for defining a proposal of the Real Time Enhancement to Standard Minimal BASIC. The committee is also able to influence the whole BASIC Standard by providing comments and suggestions on other parts of the language.

A number of members of the committee have reported on the work of the group and on personal activities in the field of BASIC to various workshops and conferences. A number of implementations of IRTB produced by systems designers and main frame vendors are being influenced by the work of TC2.

3. State of BASIC Standardization

During 1977 a Standard for Minimal BASIC has been introduced and agreed on by both ANSI and ECMA. Currently the work on enhancement modules is on-going. A first common meeting between ANSI, ECMA and Purdue will take place in London, Nov. 14th to 18th, 1977. At this meeting TC2 will present a proposal for a Real Time Enhancement module.

The proposal consists of two parts: Level 1 being the proposal for the current standardization; Level 2 being the proposal for future enhancements. Two new concepts have been introduced into BASIC: concurrent activities with scheduling, synchronization and communication at run-time; and input/output (I/O) to 'process objects'. Process objects are typically measurement and control points in a plant interface, such as temperature sensors or stepping motor controllers. The functional capabilities of the proposal correspond to the capabilities of IRT FORTRAN and LTPL, while the syntax aims to reflect the style of the BASIC language.

4. Personal Affairs and Future Plans

The International Chairman of TC2 (currently Eric Crichton) is now a member of the ANSI/ECMA BASIC Enhancement Committee. The current regional Chairmen are John Herbster (America), Volkmar Haase (Europe), and Koji Yada (Japan).

As Eric unfortunately cannot accept re-election to this position, Gordon Bull, from Hatfield Polytechnic England (presently at Dartmouth College, Hanover, H. N.) has been nominated to be the International Chairman elect. Gordon is the official liason person between ECMA and ANSI and is also a member of TC2.

The final standard for IRTB (in the ANSI/ECMA BASIC Standard framework) hopefully will be completed by the end of 1978. While there are likely to be few technical problems some difficulties may have to be overcome in financing the attendence of TC2 members at meetings of Standards Committees in both America and Europe.

E. Crichton
V. Haase

Real - Time BASIC

Koji Yada
Chairman of RT - BASIC WG in IPW-J
Manager, Computer Center,
Electrotechnical Lab.,
5-4-1, Mukodai, Tanashi, Tokyo, Japan

Contents

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1 Activities of RT - BASIC Working Group in Japan

RT - BASIC Working Group in Japan, established in July, 1977, is now making the following activities.

(1) Investigation of the documents on RT - BASIC
(proceedings, magazines, papers, etc.)

(2) Analysis and evaluation of RT - BASIC for CAMAC specifications

(3) Evaluation of RT - BASIC's offered by manufacturers
(Japan Minicomputer, Shimazu Factory, Shiba Measuring Instruments, ASR, Textoronics, etc.)

(4) Investigation into minimal BASIC

(5) Discussion on the documents offered from foreign RT - BASIC associations.
(e.g. Dr. Volkmar H. Haase, Institut fur Angewandte Informatik)

(6) Preparation of the comments for the Joint Meeting which is going to be held in London, November 12-14, 1977

Summaries of the activities that have been made are shown in RT - BASIC WG Minutes, INSERT I, II, III, and IV.

Members list of RT - BASIC Working Group in Japan is shown in INSERT V.

2 RT - BASIC in Japan

RT - BASIC is not so popular in Japan because its features are considered to be insufficient for industrial applications. The application inquiries made by IPW - J in 1974 showed that there were very few to be utilized.

However, recent inquiries for RT - BASIC for CAMAC as shown in INSERT VI reveals that RT - BASIC has been gradually used for laboratory automation and in the field of computing instrumentation (INSERT VII), which proves that RT - BASIC has been noticed in Japan.

RT - BASIC's implied by Japanese manufacturers are as follows:

° Real Time BASIC	Japan Minicomputer, Inc.
° BICOMS	Shimazu Seisakusho, Ltd.
° BASIC LAB	Takeda Riken, Inc.
° BASIC - 11/LAB	Automation Systems Research
° MI - BASIC	Shibasoku, Inc.

The statements of above RT - BASIC's are quite various. RT - BASIC WG is making detailed analysis on these statements.

3 RT - BASIC Standardization in Japan

Activities for standardization of RT - BASIC have been just started by RT - BASIC Working Group in Japan. We have begun with analysis and estimation of ANSI/ECMA Standard gained in September. We are planning to present the conclusion to Joint Meeting which will be held on November 12 to 14, 1977 in London.

Activities on RT - BASIC for CAMAC have also just begua. We would like to endeavor for standardization of RT - BASIC in cooperation with foreign countries.

4 Discussion on ANSI/ECMA Standard

On ANSI/ECMA Standard, there is still a lot of ambiguities left for us, since RT-BASIC WG of IPW-J has worked on this standard for only a few weeks.

Attached are the lists of questions on RT-BASIC Enhancement Level 1 and Level 2.

(1) The Questionaire on RT-BASIC level 1

RT-BASIC IPW-J

1) What manufacturer's BASIC did become the sample of RT-BASIC Enhancement Level 1 ?

2) What kind of machine is supposed in Enhancement Level 1 ? Minicomputer or microcomputer?

3) What kinds of features must OS have; e.g. task management and file management?

4) Which unit level does multiprocessing have, statement unit level or subroutine unit level?

5) What does 'smallest interruptable element' refer to in practice? Is it unsuitable to interrupt instantly or follow the interrupt priority level?

6) What is the feature of CHAIN statement?

7) Which does 'X' in 190-13 refer to, a byte, a word (16 bit), or a floating point variable?

8) Is it possible to write multiple assignment statements in LET statement?

```
10 LET A=C, B=0, C=0, D=0
```

9) Is it allowed to write multiple assignment statement in one line?

```
100 PRINT "A=" ; & INPUT A
```

10) What is the relation between parallel sections in Enhancement Level 1 and tasks in Level 2?

(2) The Questionaire on RT-BASIC, level 2

RT-BASIC IPW-J

1) TASK statement

° How many digits can be used for task priority set?
° How should the tasks in the same priority be handles?
° How should the difference between core resident task and overlay task be considered?
° Are all the task schedulings left to OS?

2) WAIT statement

° Is there no necessity to specify absolute hours, minutes, and seconds for TIME specifiction?

° Same question for WHEN TIME, where time-set statement is required.

3) Process I/O

° Is the description for analog-digital I/O devices established; such as standard 61.i in industrial FORTRAN?

4) Data

° Will the internal representation of DATA gained from process I/O be handled in integers or floating point variables?
~~(handlings of Data from digital I/O and A/D converters BCD, binary, integers of 1W, characters (ASCII))~~

5) File

° Do data file structure formats also tend to be transformed into STD?
~~READ/MATREAD WRITE/MATWRITE~~

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ANNUAL MEETING OF INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL C--ETC(U)
1977 N00014-78-C-0127

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2 OF 5
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RT-BASIC WG Minutes (The 1st Meeting)

1 Date : July 28, 1977
from 10:00 A.M. to 1:00 P.M.

2 Place : JEIDA, Council Room

3 Participants : K. Yada (ETL)
Ogita (IPCR)
Onoda (Japan Minicomputer)
Tanaka (Toshiba)
Furusawa (JEIDA)
Kogawa (JEIDA)

4 Materials : No.1-1 : The Survey's Report on Industrial Computers (51-A-100)
No.1-2 : " (52-A-117)
No.1-3 : RT-BASIC for CAMAC
No.1-4 : Minimal BASIC
No.1-5 : CAMAC Software, IEEE, 1977
No.1-6 : CAMAC Software, AEC
No.1-7 : CASIC

5 Proceedings : Chairman, K. Yada

1' Plans of Investigation into RT-BASIC
(1) Investigations into documents oñ RT-BASIC
(2) Evaluation of RT-BASIC for CAMAC
(3) Investigations of RT-BASIC for industrial computers

2 Acqusition of Documents

The documents we collected could be classified as follows;

° RT-BASIC
(1) (50-A-94) Industrial Computer Systems
(2) (50-A-100) "
(3) (52-A-117) "
(4) RT-BASIC for CAMAC
(5) Purdue Europe RT-BASIC, First Report, 1975
(6) HP-RT-BASIC
(7) Minimal BASIC
(8) TEK 4051 BASIC
(9) IBM 5100 BASIC

° CAMAC
(1) CAMAC Software, IEEE, 1977
(2) CAMAC Software, AEC
(3) CASIC

3 Treatment of RT-BASIC for CAMAC

Translations of RT-BASIC for CAMAC will be treated as recommended standards by RT-WG.

4 Relationship with Purdue Workshop

RT-WG will present some announcement for next Purdue Workshop which will be held from October 3 to 6, 1977. Relationships with ESONE, IEC, etc. are also desirable.

5 Additional members

WG asked thses persons' participation
° Mr. Iharada (Mitsubishi)
° Mr. Kumagai (Pana Facom)
° Mr. Miura (High Energy Lab.)

6 Next Meeting

Date : August 25, 1977
from 10:00 A. M.

Agenda : 1 Investigation of answers for inquiries
2 RT-BASIC Status Quo of Toshiba and Japan Minicomputers
3 RT-BASIC for CAMAC
4 The other items

INSERT II

RT-BASIC WG Minutes (The 2nd Meeting)

1 Date : August 25, 1977
from 10:30 A.M. to 1:00 P.M.

2 Place : JEIDA, Council Room

3 Participants : K. Yada (ETL)
Ogita (IPCR)
Tanaka (Toshiba)
Ohba (Shimazu)
Hirose (Mitsubishi)
Kawakami (Fujitsu)
Onoda (Japan Minicomputer)
Yoshida (Fujitsu)
Kumagai (Pana Facom)
Furusawa (JEIDA)
Kogawa (JEIDA)

4 Materials : No. 2-1 : Material for the 2nd Meeting
No. 2-2 : Reports of the Industrial RT-BASIC COMM.
No. 2-3 : RT-BASIC's of Japan Minicomputers and NOVA
No. 2-4 : Inquiries for General Status of BASIC Languages Utilization (Proposal)
No. 2-5 : TEKTRONIX 4051 BASIC
No. 2-6 : Comments on R-T BASIC for CAMAC

5 Proceedings : Chairman, K. Yada

1 Confirmation of the last minutes

2 Self-introductions by new members
Ohba, Hirose, Kawakami, Yoshida, and Kumagai

3 Contact with foreign countries

Foreign related committees were announced as follows;

Dr. T.J. Williams (Purdue Univ.)
Mr. E.R. Crichton (Kent Automation Systems)
Mr. J. Herbster (Herbster Scientific)
Dr. H. Haase (Institut Fuer Angewandte Informatik)
Dr. H. Meyer (ESONE Secretariat)
Mr. L. Costrello (NBS)
Mr. C.J. Stanford (IEC)

Moreover, there announced was a suggestion that WG will present some materials for the BASIC Committee at International Purdue Workshop which will be held on October 3 to 6, 1977 in U.S.A.

4 Introduction of NOVA RT-BASIC (Japan Minicomputers)

Mr. Onoda of Japan Minicomputers, Inc. described about NOVA by referring to material No. 2-3, especially on bit process functions, process I/O features, plotter process features, and multi-tasks process features.

5 Comments of RT-BASIC for CAMAC

Mr. Tanaka of Toshiba Electric, Inc. presented some comments on the following items in DRAFT PROPOSAL RT-BASIC FOR CAMAC (June, 1975) by referring to material No. 2-6.

° Concepts of TASKING
° Process variables
° Control statements
°Interrupt processing
° ERROR statements

6 Inquiries for the general status of BASIC languages utilization

Mr. Onoda of Japan Minicomputers, Inc. announced about the proposal for inquiries by referring to material No. 2-4, which was agreed to be realized before the next Meeting through several examinations.

7 Next Meeting

Date : September 16, 1977
from 10:30 A.M.

RT-BASIC WG Minutes (The 3rd Meeting)

1 Date : September 16, 1977
from 10:30 A.M. to 1:30 P.M.

2 Place : JEIDA, Council Room

3 Participants : Yada (ETL)
Ogita (IPCR)
Onoda (Japan Minicomputer)
Yoshida (Fujitsu)
Kumagai (Pana Facom)
Inomato (Atomic Energy)
Shirako (Fujitsu)
Hirose (Mitsubishi)
Ihara (Mitsubishi)
Tanaka (Toshiba)
Ohba (Shimazu)
Yanai (Shibasoku)
Okada (ASR)
Furusawa (JEIDA)

4 Materials : No. 3-1 : MI-BASIC, Software Manual
No. 3-2 : Industrial BASIC
No. 3-3 : Report on RT Extension and Implementations of RT-BASIC
No. 3-4-1 : Purdue Europe TC-2, Industrial RT-BASIC
No. 3-4-2 : RT-BASIC, Section 190, Level 1 Enhancement
No. 3-5 : RT-BASIC for CAMAC (ESONI/RTB/02)
No. 3-6 : The Development of CAMAC Software
No. 3-7 : Real-Time BASIC for CAMAC
No. 3-8 : ESONE/PTB/02 (Announcement)
No. 3-9 : Inquiries for General Status of BASIC Language Utilization (Proposal)
No. 3-10 : RT-BASIC for CAMAC from the view point of Minimal BASIC

5 Proceedings : Chairman, K. Yada

1 Confirmation of the last minutes

2 Introduction of Shibasoku RT-BASIC

MI-BASIC, developped in technical cooperation with Marconi Instrument, Ltd. in England was introduced by Mr. Yanai (Shibasoku). This BASIC, first used with PDP-11, is now implemented with LSI-11 to sell. Explanation was made on program data

format, statement forms, and program operation modes.

3 Generai status of industrial BASIC in Japan

The result of the investigation on Industrial RT-BASIC made by referring to material No. 3-2. Surveys were made into documents and to produce a comparative table on BASIC.

4 On feature extention of RT-BASIC for CAMAC

Mr. Yoshida (Fujitsu) explained in comparison with Minival BASIC by referring to material No. 3-10.

5 Proposal for the inquiry were explained by Mr. Tanaka (Toshiba) and approved. Mail list will be prepared at Executive Office objecting measuring instrument users.

6 The other items

(1) Material No. 3-4-1 will be investigated by Mr. Yoshida (Fujitsu)
(2) No. 3-4-2 will be surveyed by Mr. Ohba (Shimazu) and No. 3-4-3, by Mr. Onoda (Japan Minicomputer), in comparison with BASIC's of their companies.
(3) No. 3-5 through No. 3-8 will be investigated at Nuclear Lab.

7 Next Meeting

Date : September 27, 1977

RT- BASIC WG Minutes (The 4th Meeting)

1 Date : September 27, 1977
from 2:00 P. M. to 4:30 P. M.

2 Place : JEIDA, Council Room

3 Participants : Yada (ETL)
Ogita (IPCR)
Onoda (Japan Minicomputer)
Shirako (Fujitsu)
Yoshida (Fujitsu)
Kumagai (Pana Facom)
Hori (Toshiba)
Ohba (Shimazu)
Yamai (Shibasoku)
Okuda (A. S. K.)
Furukawa (JEIDA)

4 Materials : No. 4-1 ; Enhancement to Minimal BASIC (Fujitsu)
No. 4-2 : Industrial Real-Time BASIC, section 190- Level Enhancement.

5 Proceedings : Chairman, K. Yada

1 Industrial real-time BASIC

The general concept of industrial real-time BASIC was explained by Mr. Yoshida (Fujitsu). On its level-1,was commented by Mr. Yanai (Shibasoku), and level-2 by Mr. Onoda (Japan Minicomputer), There were detailed questions and requirements asked by the members on above subjects.

2 Joint Meeting on BASIC in London

It was agreed that each member should prepare any questions and inquiries to present for the Joint Meeting in London before the next Meeting.

6 Next Meeting

Date : October 25, 1977
from 10:00 A. M.

Real - Time BASIC WG Members List (IPW - J)

Koji Yada	Manager Electrotechnical Lab. Computer Center	5-4-1, Mukodai, Tanashi, Tokyo 0424-61-2141
Naofumi Ogita	The Institute of Physical and Chemical Research	2-1, Hirosawa, Wako, Saitama 351 0484-62-1111
Soji Shirako	Fuji Electric Co., Ltd. Information Data Processing Dev. of Industrial Computer Application	1, Fuji-machi, Hino, Tokyo 0425-83-6111
Toshimi Hirose	Mitsubishi Electric Co., Ltd. Computer Manufacture	325, Kaminachiya, Kamakura Kanagawa 0467-44-1111
Katsuhiko Ohba	Shimadzu Seisakusho Co., Ltd. System Dev.	1, Kuwabara chyo, Saiin, Nakagyo, Kyoto
Tatsuji Tanaka	Tokyo Shibaura Electric Co., Ltd. Heavy apparatus Lab.	1, Toshiba cho, Fuchu, Tokyo 0423-66-1111
Yoshihiro Onoda	Nippon Mini-Computer Co., Ltd.	6-12-20, Jingu-Mae, Shibuya-ku, Tokyo 03-406-6451
Shinya Yoshida	Fujitsu Ltd.	1812-10,, Shimonumabe, Nakahara, Kawasaki, Kanagawa
Akira Kumagai	PANAFACOM . Ltd.	2-10-16, Jiyugaoka, Megro-ku, Tokyo
Osamu Yanai	Shibasoku	848 Wakamatsu, Tokorozawa, Saitama
Noboru Okuda	Automation System Research	3-15-8, Nishi-Shinbashi, Minato-ku, Tokyo
Akira Furusawa	JEIDA	3-5-8, Shibakoen, Minato-ku, Tokyo

INSERT VI

Inquries for General status of BASIC Languages Utilization (Proposal)

RT - BASIC WG, IPW - J
1977 8/25 OS

(1) General BASIC

1.1 Do you use a BASIC language now?

a. yes b. no c. no, but planning to use

1.2 What do you or will you use BASIC for?

a. business transaction
b. scientific and technical computing
c. process control
d. instrumentation

1.3 What type of computer do you use BASIC with?

a. TSS
b. minicomputer
c. microcomputer

name of the product ( )

(2) Real - time BASIC

2-1 Do you use real-time BASIC now?

a. yes b. no c. no, but planning to use

2.2 Where was your real-time BASIC developped?

a. home brewed
b. by other manufacturer
c. by foreign manufacturer

name of your BASIC language ( )
manufacturer ( )
OS ( )

2.3 Are you satisfied with the capacity of your real-time BASIC?

a. yes   b. no

Why are you satisfied or dissatisfied?

(3) Interface with Measuring Instruments

What is your interface standard and its supporting language?
Where were they developped?
Please check in the appropriate blanks.

language / standard	BASIC	FORTRAN	PL/1 Subset	Assembly	Software Manufacturer *	Interface Manufacturer **
home-brewed						
other manufacturer						
IEEE 488 (GPIB, HP-IB)						
CAMAC						

* Please check the software manufacturer of your interface.

* Please check your interface hardware manufacturer.

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IRTB-E 17/77 18-Aug-77

INDUSTRIAL REAL-TIME BASIC

Section 190 - Level 1 Enhancement

INTRODUCTION

For use in real-time applications two new concepts must be introduced into BASIC: concurrent activities with scheduling, synchronisation and communication at run-time; and input/output (I/O) to 'process objects'. Process objects are typically measurement and control points in a plant interface, such as temperature sensors or stepping motor controllers.

Concurrent activities are introduced in level 1 by START statements activating 'parallel sections' within a program. WAIT statements are defined to suspend a parallel section, and allow it to continue at an absolute time, after a timed delay, or in response to an 'event' (a software signal or a hardware interrupt). Communication between concurrent activities is via normal variables, since all variables are global to the whole program.

Process I/O is by means of read and write statements that transfer data between process objects and the computer memory. The names and other attributes of the communication paths used by the system to perform the I/O are given in declaration statements. If a filing system is implemented the declarations can be put into one or more 'environment description' files that are accessed by USE statements at the head of the program, otherwise the declarations themselves must be at the head of the program. In this way a program can be divided into two parts: an implementation dependent environment description, and implementation independent programs that share the environment description, and for which the particular process peripheral interface system is completely transparent.

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In the level 2 enhancement (section 209) the concept of a task is introduced. A task, like a sub-program, is an independently compiled program with its own local variables, but it is activated in the same way as a parallel section rather than called with a parameter list. Inter-task communication is by read and write statements that transfer messages over communication paths. Message communication paths are declared in the same way as process object communication paths.

190 PROGRAM STRUCTURE

190.1 General description

A program comprises a header and one or more parallel sections.

The header determines the process environment for the program, by declarations or by USE statements that refer to environment description files containing the declarations, according to the facilities available in the implementation.

Each parallel section is named, and is delimited by the keywords PARACT and PAREND. Scheduling statements refer to parallel sections by name rather than by line number, in order to be compatible with the level 2 multi-tasking extension.

Within a parallel section program lines are executed in sequential order as defined for Minimal BASIC. Control cannot be transferred between parallel sections with the program control statements GOTO, GOSUB or ON: a parallel section is started at its lowest line number by a scheduling statement. Execution of a PAREND or PAREXIT statement terminates execution of the corresponding parallel section. Execution of a STOP statement terminates the whole program.

Section 191 contains the definition of the dec-statement and section 192 contains the definition of i-o-statement.

190.2 Syntax

```
1. program      > header? par-section* end-line

2. statement    > i-o-statement/scheduling-statement
                  /parexit-statement

3. header       = (use-line/dec-line)*

4. use-line     = line-number use-statement end-of-line
```

5. use-statement = USE quoted-string

6. dec-line = line-number dec-statement end-of-line

7. par-section = paract-line block* parend-line

8. paract-line = line-number PARACT section-name end-of-line

9. section-name = letter digit?

10. parend-line = line-number PAREND end-of-line

11. parexit-statement = PAREXIT

190.3 Examples

4.
```
20 USE "DK1:PRODEC"
```

7.
```
1000 PARACT Q3
1010 WAIT TIME = 17*60*60
1020 PRINT "TIME TO GO HOME"
1030 PAREND
```

190.4 Semantics

The quoted string in a USE statement identifies an 'environment description file', ie. a file containing declarations of communication paths to process objects and from interrupts. Its format is implementation dependent.

Program execution starts at the lowest line number, ie. at the beginning of the first parallel section. Other parallel sections are started explicitly by START statements.

If a CHAIN statement is executed, then all outstanding scheduling calls to start or continue parallel sections must be cancelled, since after execution of the CHAIN statement the programs to service them will no longer be in memory.

A PARACT statement is not executable, its purpose is to introduce the name of a parallel section and indicate its lexical beginning. A PAREND statement indicates the lexical end of a parallel section. Execution of a PAREND or PAREXIT statement terminates the section.

190.5 Exceptions

The file referenced in a USE statement cannot be accessed.

A GOTO, GOSUB, IF or ON statement refers to a line in another parallel section.

190.6 Remarks

Some implementations may have an additional parameter in the PARACT statement indicating a priority level of execution of the section. For these implementations, rule 8 becomes:

```
8. paract-line      = line-number PARACT section-name colon
                      integer end-of-line
```

where the integer indicates the priority level, higher numbers representing higher priority.

The definition of parallel sections implies multi-thread, not single-thread execution. Multi-thread means that from a state where several parallel sections have been started, the return of control does not necessarily follow the same path in reverse, as in the case of nested subroutine calls for example. A consequence of single thread is that a WAIT statement would suspend the whole program, whereas the intention is to allow other activities to proceed during the waiting period.

The data in all DATA statements throughout the program is concatenated as defined in Minimal BASIC. Each parallel section must, however, maintain its own conceptual pointer, since a single pointer would result in unpredictable behaviour due to the indeterminate sequence of execution of the sections. A RESTORE statement in a parallel section sets the local conceptual pointer to the beginning of the data in the whole program.

190.7 Inter-module dependence

The USE statement implies the existence of a filing system. If a filing system exists it could be outside the BASIC language, so that the environment description files must be created independently, or it could be the Files Enhancement in which case the environment description could be handled by the BASIC system.

For interrupt driven systems, any sub-programs called from parallel sections must be either non-interruptable or re-entrant.

190.8 Resolved questions

None.

190.9 Open questions

What is the smallest interruptable element? A simple implementation may delay interrupt servicing until the end of the current statement, but this could cause very long delays, particularly in the case of INPUT and PRINT statements. On the other hand, for implementations that store a value in more than one computer word, access to a variable used for communication between sections must not be interrupted or the result could be nonsense. Is it possible to make a recommendation, or should the decision be left entirely to the implementer? Should the user be provided with a mechanism for protecting a statement, a block of statements or a parallel section against being interrupted?

How should DATA, READ and RESTORE statements be handled?

1. As in Minimal BASIC with a single conceptual pointer incrementing through all the data in sequence.

2. With DATA, READ and RESTORE local to each parallel section.

3. With a local pointer in each section, but a single set of data derived from all the DATA statements in the program.

Solution 1 is not viable if READ or RESTORE statements appear in more then one parallel section because the sequence of execution of the sections can be unpredictable. Solution 2 does not allow the same data to be used in different sections unless the data itself is duplicated, and it changes the semantic definition of DATA statements in Minimal BASIC. Solution 3 has been tentatively chosen in section 190.6 since it is the simplest viable solution and it requires the minimum changes to definitions in other modules. This solution could lead to confusion in that changing the DATA statements in one parallel section changes the sequence of data read in all other sections.

191 DECLARATIONS AND THE ENVIRONMENT DESCRIPTION

191.1 General description

Declaration statements define the attributes of communication paths between elements of a real-time system. The communication paths link to process objects and to interrupt sources.

A declaration gives the name of a path and its attributes. The attributes are essentially system dependent, and will typically include the address of the element and the format of its data. The format information allows the system to perform automatic data transformation, such as between BCD in a process object and floating point in the internal representation. An implementation may allow procedure names in a declaration so that special devices can be handled by the standard mechanism. The procedures could for example handle access via a multiplexer with a long switching time, or special Gray code devices. The procedures are invoked automatically each time the communication path is accessed.

191.2 Syntax

```
1. dec-statement            = process-path-dec/interrupt-path-dec

2. process-path-dec         = process-dimension-dec
                              /process-attribute-dec

3. process-dimension-dec    = PRODIM path-name open integer
                              (comma integer)? close

4. path-name                = letter digit?

5. process-attribute-dec    = PRO qualifier? ident quoted-string

6. ident                    = path-name (open integer (comma
                                           integer)? close)?

7. qualifier                = IP/OP/IO colon

8. interrupt-path-dec       = INTERRUPT path-name colon path-name
                              quoted-string
```

191.3 Examples

```
3. 30 PRODIM T1(10,3)

5. 35 PRO C "27"
   40 PRO (IP) T1(2,3) "(5,1) (BCD 4)"

8. 50 INTERRUPT 01: C "9"
```

191.4 Semantics

A process path can communicate with a single entity or an array of entities in the interface system. The elements of such an array are not necessarily associated at the hardware level - as for an array of variables, an array of process objects is used when they are treated as a logical group in the program (for example temperature, level and flow rate in each of 5 reactor vessels could be handled as a 3 by 5 array). The declarations for such an array must first declare the dimensions of the array in a process dimension statement, and then declare the attributes of each entity in a process attribute declaration.

The qualifier can be used to indicate an input-only or output-only process object. The translator uses this information to check the validity of I/O statements. The default qualifier is IO.

The second path-name in an interrupt declaration is the name of the path communicating with the process object that is the source of the interrupt. This information may be needed by the system to enable and disable the interrupt. The quoted string identifies the interrupt route into the computer; it could be for example an interrupt vector number.

In the case of an array, the process dimension declaration must precede the associated process attribute declarations, and all members of the array must be defined in process attribute declarations.

191.5 Exceptions

A member of an array is not defined by a process attribute declaration.

Other errors are system dependent, and are mainly concerned with the parameters of the particular process peripheral system (for example illegal device addresses).

191.6 Remarks

It is intended that the set of declarations for process and interrupt communication paths be written by the person who configures the system, and stored in one or more 'environment description files'. The application programmer will have available a list of the names used and the functional characteristics, and will refer to the declarations by a USE statement in his program. There can thus be a division of responsibilities between these two types of expertise.

An implementation may include system-defined names for paths connecting to permanently installed process objects. Such names do not need declarations, either in the program or in an environment description file.

191.7 Intermodule dependence

There are problems in passing communication paths as arguments to sub-programs. The sub-program must include a formal declaration for the entity, and the actual argument must be passed in a way that is independent of the number of parameters needed to define it.

The Files enhancement committee is asked to comment on the remarks concerning I/O in section 191.9.

191.8 Resolved questions

None

191.9 Open questions

Should arrays of process-object communication paths be in the level 1 or the level 2 enhancement?

Should process objects have an identifying character, by analogy with the $ indicating a string quantity? The problem is that IRTB may need process objects, interrupts, software events, integers, bit patterns, section names and, for level 2, program names and message path names. Firstly, there are not enough special characters available, and secondly, even if there were, it is arguable that such a proliferation of special characters would be confusing rather than helpful. A better solution is to implement multi-character names so that the user can solve the problem by choosing meaingful mnemonics.

Two kinds of I/O are required in RT-BASIC: process I/O and the I/O defined in Nucleus and the Files Enhancements. There are three possibilities:

1. Handle process I/O with INPUT and PRINT as in the Files enhancement.

2. Handle file I/O in the same way as process I/O by adding a peripheral-path declaration.

3. Define two types of I/O.

The IRTB committee does not favour solution 1 because the formulation 'channel-number' is not very convenient for handling the typical case of hundreds of process objects, usually grouped in arrays. The use of names rather than numbers is essential for program intelligibility. Also PRINT does not have the right connotation for the output of a set point to a temperature controller for example.

Solution 2 is elegant. A peripheral-path declaration could be of the form:

```
peripheral-path-dec  =  CHANNEL qualifier? path-name colon quoted-string
```

eg.

```
CHANNEL (IO) F3:"DKO:RUN1.DAT"
```

Process I/O and control statements could then be used, eg:

```
CON F3: OPEN
WRITE F3: A,B,C
```

Solution 3 is probably the only acceptable one. However, an implementation may adopt solution 2 as a local option.

192 PROCESS I/O

192.1 General description

READ and WRITE statements are used to move data over communication paths between elements of the system.

The computer memory reference for a READ statement is a single variable, and for a WRITE statement it is an expression.

192.2 Syntax

```
1.  i-o-statement      =  read-statement/write-statement

2.  read-statement     =  READ path-name colon read-item

3.  read-item          =  variable

4.  write-statement    =  WRITE path-name colon write-item

5.  write-item         =  read-item/expression
```

192.3 Examples

2. 400 READ C: V1

4. 440 WRITE C1: 3.2*Y/(X+Z)

192.4 Semantics

Since there is no hidden parallelism in BASIC, READ and WRITE statements imply 'wait for completion' so it can be assumed that the data has been transferred when the next statement in sequence is executed.

192.5 Exceptions

A write operation directed to an input-only device.

A read operation directed to an output-only device.

A mis-match of data types between a variable or expression and a process object.

192.6 Remarks

Some process peripheral systems require control operations, for example to initialise a device, or to enable and disable an interrupt or data taking. Such control operations change the status of process objects without transferring data that is significant to the programmer (the change of status may be effected by writing to a status register, but such mechanisms should be transparent at the level of a BASIC program.

However, some process peripheral systems have no control operations but are only able to transfer process data. Such systems clearly cannot execute control operations, and since the definition of a conforming implementation is that it shall interpret every statement in the language according to the defined semantics, these systems would be precluded from claiming conformation if control statements were included in the definitive standard.

In the interests of standardisation between implementations that have control operations, the following supplementary rules are given. If an element of a system is able to execute an operation that is described by one of the control keywords, then that action should be

invoked by the appropriate control statement. If a system includes other control actions, such actions should be expressed by control statements using an appropriate implementation-defined keyword.

```
1. control-line       =  line-number control-statement end-of-line

2. control-statement  =  CON path-name colon control-action

3. control-action     =  OPEN/CLOSE/ENABLE/DISABLE/INIT
                         /[implementation defined]
```

192.7 Inter Module dependence

None.

192.8 Resolved questions

None

192.9 Open questions

The words READ and WRITE have been chosen because they are commonly used to refer to I/O. Syntactically and semantically this use of READ is different from the normal READ in BASIC, so should other keywords be found, perhaps SEND and RECEIVE?

193 SCHEDULING STATEMENTS

193.1 General description

In level 1 all scheduling of parallel sections is by means of START and WAIT statements. A START statement unconditionally starts the named parallel section; if it is required to execute the section conditionally, for example in response to a particular interrupt, then the section should have the appropriate WAIT statement at the beginning. A WAIT statement can suspend a section for a time interval, until a specified absolute time, or until a specified event occurs.

Level 2 provides conditional START and SIGNAL statements.

193.2 Syntax

```
1. scheduling-statement   =  start-statement/wait-statement
                             /signal-statement

2. start-statement        =  START section-name

3. wait-statement         =  WAIT (interval-condition/time-condition
                                   /event-condition)

4. interval-condition     =  DELAY equals numeric-expression

5. time-condition         =  TIME equals numeric-expression

6. event-condition        =  EVENT event-name

7. event-name             =  letter digit?

8. signal-statement       =  SIGNAL event-name
```

193.3 Examples

```
2.  600 START P1

3.  610 WAIT DELAY = 1.5*60*60
    620 WAIT TIME = M*60
    630 WAIT EVENT P1

8.  640 SIGNAL P1
```

Statement 610 would suspend the current section for one and a half hours ~~(assuming a system clock period of one second)~~, and statement 620 would suspend the section until the time `M seconds past midnight'. Statement 640 sets the event P1 to 'true'.

193.4 Semantics

A START statement unconditionally starts a parallel section at its lowest-numbered statement. An implementation must specify the action following a START statement for a parallel section that has not reached a PAREND or PAREXIT statement following a previous activation. The scheduling call may be queued, or it may cause an error condition.

A STOP statement terminates the whole program, including all parallel sections.

The expression for interval-condition defines the number of seconds. The expression for time-condition gives the number of seconds past midnight.

An event-name is either the name of an interrupt path or the name of a 'software' event. Software event names are not declared explicitly; they are declared implicitly by their occurrence in SIGNAL and WAIT statements.

At the hardware level an interrupt condition should be cleared as soon as it is recognised to allow other, possibly higher proirity interrupts to be accepted. The occurrence of an interrupt should therefore be remembered by the system until the corresponding WAIT statement has acted upon it.

Most implementations will provide control statements (see section 192.6) to enable and disable specific interrupts, since the system may include potential sources of interrupts other than those that can be serviced by the program.

A SIGNAL statement sets the associated event to 'true', so that any section waiting on that event can continue.

193.5 Exceptions

For some implementations the execution of a START statement for a parallel section that has not reached a PAREND or PAREXIT statement since a previous activation is a run-time error condition.

193.6 Remarks

None.

193.7 Inter-module dependence

There is a problem of identifying a section name or an event name passed as an argument to a sub-program.

193.8 Resolved questions

None

193.9 Open questions

Should the interval-condition and the time-condition be an expression or should it be in the form hours-minutes-seconds? Should this form be introduced as an option in level 2?

Should the WHEN clause in level 2 really be in level 1? It is not difficult to implement since it uses the same operating system facility as the WAIT statement, and its use greatly increases the intelligibility of a program.

A fundamental question is whether events are 'consumable'. If they are not, event flags must be cleared explicitly with CLEAR statements, so the three operations SET, WAIT and CLEAR are necessary. If an event is consumed (the corresponding event flag is cleared) when it is acted upon by a WHEN statement, only two operations are required, referred to as SIGNAL and WAIT.

SET-CLEAR and WAIT is a lower level approach, similar to semaphores, in which the user has more responsibility for the correct operation of the system. It has the advantage that a WAIT statement can include a list of events, so that the program can continue when any one of a number of events occurs. Since the events are not consumed they may be tested in IF statements to find which one caused the program to resume.

SIGNAL and WAIT is simpler. The possibility of errors due to forgetting to clear an event does not arise, and conceptually it is easier to understand in terms of the plain language meaning of event. In the case of SET-CLEAR and WAIT two concepts are needed, that of the event itself and of a flag of some sort in the system that remembers the occurrence of the event, otherwise the notion of 'clear event' is meaningless. If 'wait on a list of events' is required, a new construct such as ON event-list GOTO will be necessary to determine which event caused program continuation, but the same result can be achieved by setting up as many parallel sections with WAIT statements as required, each of which calls the common parallel section.

194 BIT PATTERNS AND LOGIC OPERATIONS

194.1 General discussion

In BASIC, numbers are usually expressed in decimal notation. For real-time applications the expression of bit patterns is also required, for which octal, hexadecimal or binary format is usually more convenient. By analogy with the VAL and STR$ functions defined in the Strings Enhancement Section 22, the functions OCT, HEX and BIN are used when a string expression is to be interpreted as a bit pattern in octal, hexadecimal or binary format respectively. The functions OCT$, HEX$ and BIN$ perform the conversion from a numeric value (taken as an unsigned integer) to its representation as an octal, hexadecimal or binary string.

Bit manipulation is a common requirement for real-time systems, for which the logical operations AND, OR, exclusive-OR, NOT and SHIFT are rquired. A shift function is defined, and logical operators are introduced for the other operations.

194.2 Syntax

1. bit-pattern-function = OCT/HEX/BIN/BIT/OCT$/HEX$/BIN$/SHF

2. bit-pattern-expression = bit-primary (logical-operator bit-primary)*

3. bit-primary = BITNOT? (bit-pattern /open bit-pattern-expression close)

4. logical-operator = BITAND/BITOR/BITXOR

194.3 Examples

1.
```
700 LET X = OCT("321")
701 LET X = BIN("1101 0001")
702 LET X = HEX("D1")
```

2.
```
710 LET X = HEX("C0") BITOR (Y BITAND OCT("37"))
```

If Y has the value 17 decimal, all the examples set X to the value decimal 209, assuming bit patterns are interpreted as unsigned decimal constants.

194.4 Semantics

The term 'bit-pattern' in rule 3 could be either a bit-pattern expression or a numeric value interpreted as a bit pattern. The bit pattern corresponding to a numeric value is taken as the binary representation of the modulus of the integer part.

The SHF function has two arguments, the first is interpreted as a bit-pattern that is shifted the number of positions equal to the integer value of the second. A positive number specifies a left shift, a negative number a right shift. Zeros are entered at the appropriate end so that a shift of more positions than the number of bits in the pattern returns all zeros.

The argument of the BIT function must be a positive numeric value, the integer part of which indicates the position of a '1' in a bit pattern. The value returned for the function has a '1' in this position and '0' in all other positions. Bit positions are numbered from 1 starting with the least significant.

194.5 Exceptions

The argument of one of the functions OCT, HEX or BIN is not a valid string (for example, in the case of BIN, it includes a character other than 0, 1 or space, or it requires more bits than the system can represent).

A negative numeric value is presented for conversion to a bit pattern.

194.6 Remarks

The functions OCT, HEX, BIN and BIT are useful in program statements including DATA statements, and for input from the terminal in response to an INPUT statement.

The inverse functions are most useful in PRINT statements.

194.7 Inter-module dependence

None.

194.8 Resolved questions

None.

194.9 Open questions

Should the data type 'bit pattern' or 'bit string' (character string representation of a bit pattern) be introduced for logical operations? Without a bit pattern representation, logic operations require automatic conversion between the floating-point form and the bit-pattern form, which could be very time consuming. If bit patterns are introduced, are implied type conversions allowed or should the functions FIX and FLOAT be defined for explicit type conversion.

Can the reply to an INPUT statement be typed in octal, hexadecimal or binary form? If so, is this pre-determined in the INPUT statement or can the bit-pattern functions be used?

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DEC - 8 1977

November 25, 1977

Prof. Theodore J. Williams
Purdue Laboratory for
Applied Industrial Control
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907
U.S.A.

Dear Prof. Williams

It was very nice to meet you at IPW meeting. We have had several meetings of IPW- J since I came back to Tokyo.

RT-BASIC WG had investigated about Industrial BASIC Level 1 and Level 2 Enhancement, and offered some comments to london Meeting. Enclosed please find a copy of those comments. And also please find a copy of report which Microcomputer WG discussed about our activities hereafter.

Sincerely yours,

Koji Yada

Koji Yada
Computer Center

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November 2, 1977

Comments made by Japan Real-Time BASIC Committee on the Comments of IRTB-E/77-17 (level 1 IRTB) which had been given by Dr. Bull.

Koji Yada
Chairman
Real Time BASIC Committee IPW-J

The members of Japan Real-Time BASIC Committee have discussed on Dr. Bull's comments of IRTB-E/77-17 (level 1 IRTB) and agreed to the most of his comments. But there have arised some questions, different comments, and additional comments, which are described as follows.

Comments

2\. p4 1 1-7

If every parallel section has its own pointer, it may be better to change the syntax in order to reduce the interpreter's responsibility.

4\. p5 1 -51

Just the same commnet. Is whole siutax left to the system manufacturers?

13\. p8 syntax

Why 5 write-item= read-item/expression should be 5 write-item= expression?

14\. p10 1-32

Why should it be 6 event-name=EVENT (event-name/path name)? Is event-name the mistake for event-condition?

Additional Comment for the London Meeting

Dec statement should not be statement command but control command in order not to be changed in application programs.

CHAPTER IV

REPORTS OF THE
LONG TERM PROCEDURAL LANGUAGES COMMITTEE

The following documents are included here:

1. Minutes of the LTPL-C Meeting at Purdue on October 3-6, 1977.
2. Minutes of the 34th Meeting of LTPL-E, Brussels, September 15, 1976.
3. Minutes of the 36th Meeting of LTPL-E, January 31-February 2, 1977.
4. Minutes of the 38th Meeting of LTPL-E, Brussels, June 1-3, 1977

LTPL-C/??
77/11/07

To: LTPL-C Members

77/11/07
Alex J Arthur
IBM Corp, M77/G20
555 Bailey Ave
San Jose, CA 95150, USA

LTPL-C Meeting at International Purdue Workshop Meeting, 77/10/3-6

The meeting was called to order by Peter Elzer, Chairman pro tem. The consolidated list of attendees at all sessions is enclosed.

0. The enclosed agenda was agreed on.

1. The minutes of the previous meeting were approved without change.

2.1) A short report on the activities of the LTPL-A was given by Alex Arthur.
The LTPL-A has met 3 times since the last LTPL-C meeting. The main work of the committee has been to do a detail critique on the DoD IRONMAN document. The results of that review have been forwarded to DoD. Otherwise the committee has done some work on the green sheets and has had a joint discussion with TC-1A on tasking. The future meetings of the LTPL-A are in January, 78(San Diego - joint meeting with TC-1A) and at the Spring Americas Regional Workshop(Purdue) in April of 78.

2.2) A report on the LTPL-E activities was given by Peter Elzer. LTPL-E has had 3 meetings in full session in the last year, January(Brussels), April(Ispra) and June(Brussels). The proposed September meeting has been postponed until October 17-19. Further meetings are scheduled for end January 1978(Brussels) and at the Spring Regional Workshop meeting(Zurich).
The subgroup participated in a DoD HOL meeting at I.D.A.(Washington) in July of this year.
A caucus meeting of the tasking subgroup took place on September 19-20 (Brussels). The participants were Timmesfeld, Wand, Kronental and

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Roberts. They have produced a new write up on the subject which is currently being typed.

This was one of the first meetings under a new custom which LTPL-E is trying to establish. It is to have intensive working sessions of the working groups to produce consistent write ups.

The 3 main aspects of the past year's work have been

A) produce papers for the CEC(chair and planning group)
   i) major proposal
   ii) snapshot report
   iii) prioritised list of urgent work items

B) monitoring DoD effort
   i) comments by individuals
   ii) papers for DoD briefing sessions

C) detail work on LTPL
   i) tasking group is well along
   ii) algorithmic group is not so far along
   iii) I/O(Prof Verroust - chair)
   iv) evaluation criteria(chair and scope of work problems)
      These last 2 are suffering from staffing problems.
   v) system description - important but has not started due to understaffing of others.

Mr Reh has got a lot of material for PLIP purposes.

For the next international meeting, LTPL-E hopes to have a major paper on the state of the art.

2 aspects can be split off
   1) DoD HOLWG
   2) Program Development Tools - i.e. things beyond the language.

The chair is attempting to get a subgroup started on this last.

Some discussion was held on mailing problems. Peter said he would remind his members of the problems. He then discussed the new numbering scheme which they have been forced to introduce due to communication problems and costs. Some queries about the possibility of using the ARPA net for such purposes were made but Col. Whitaker pointed out that such was not the net's purpose and the postal authorities in UK and Germany would be reluctant to approve of such a use.

2.3) There being no representative present from LTPL-J, mention was simply made of JEIDA report 52-A-117 and a letter from Mr Sudo re his resignation as LTPL-J chair and the addresses of the relevant individuals(previously distributed).

3. Merritt Adams presented a set of foils on the status of TC 97/SC 5/WG 1(PLIP).

- Brief History and Background
- Agenda of London meeting

US delegates advocate support of ISA S61.1 and S61.2.

Jones: Why CORAL rather than PTL/2?

Harrison: We don't know.

Shorter: There is a UK government project to support CORAL 66. BSI DPS 13 is going to send out 'CORAL 66' plus clarifications. WG2 is now processing RTL/2.

The US delegates also advocate submitting updated green sheets and that the Workshop support submission of IRONMAN.

There are 3 papers already submitted by the US delegates: one is a response to the FORTRAN commentary documents, and two are relative to the functional requirements statement. The first of these refers to the Munich paper with concern and the second is a detail critique of the BSI document. This last document, the BSI submission, is felt by the US delegates to be an excellent piece of work and sets a very high standard for the other delegations to emulate.

A fourth paper is ready for submission and a draft of it has been circulated. The final version will be prepared after the USTAG meeting(77/10/4). The paper addresses CORAL 66 and suggests it be dropped from further consideration as it(as specified in document N20) does not satisfy the criteria. Although N20 plus some extensions might be functionally OK there would then be some concern about the extent of use, etc.

Elzer: I input the LTPL-C/E functional requirements to the DIN effort. (see item 3 on 3rd last page referencing N36).

Elzer: It would appear that we need to update and consolidate our functional requirements.

There was then much discussion which eventually reached the conclusion that this should be done and that we should do it by tracing all our past documents onto a skeleton format derived from IRONMAN.

4. Col Whitaker summarised the DoD HOL history and status as follows.

The effort is really a 'commonality' effort rather than a standards effort. It is specifically directed to 'embedded computers', that is, computers used in Weapon Systems, Communications, Command and Control, Avionics and Simulators. DoD has a very high software cost for such machines and commonly has to support them for many years after their initial introduction into service including development work to update or change the mission. Col Whitaker pointed out that he had carefully not used the word maintenance for this activity as the DoD experience was that in reality programs are not 'maintained' in the sense that that word suggests to everyone, except programmers, but rather programs are subject to continuous redevelopment.

Directive 5000.31 allows only the use of COBOL-74, FORTRAN-66, CMS-2, SPL-1, TACPOL, and JOVIAL J3 and J73. The '5000' series of directives are all concerned with embedded operations. In response to a question, Col Whitaker confirmed that PL/I is NOT on that list. It is apparently on an ADP list.

The project was initiated by forming the HOL WG. Their first task was to formulate requirements. In synopsis their requirement list was as follows.

- Modern HOL(don't need ANY machine language)
- need Programming Tools to support the language
- common HOLs
- minimal number
- single common DoD HOL looks feasible.

The TINMAN document was fully blessed by all of the services.

The successful contractors were CII-Honeywell-Bull, Intermetrics, Softech and SRI, International. All 4 were PASCAL based but that was just the way it turned out. The schedule is

8/77 Design Contracts
4/78 Phase 1 Selection
4/79 Final Selection
1980 Language Available.

It is not yet clear whether this last will include adding the language to the 5000.31 list at that time.

On October 20th, reports will be made on 3 economic analyses which are proceeding semi-independently. This is not normal for a project expenditure of this low a volume but it is felt that the impact is potentially great enough that it is worth doing. The questions these analyses are attempting to answer are:

Is 1 language very much less costly than 7, how can a new language be best phased in, what are the trade offs in terms of savings versus costs and difficulties and where should the expenditures be concentrated?

The DoD HOL WG is now beginning a non-language requirements analysis. The STRAWMAN document for this has just been typed, WOODENMAN is expected by 78/1/1, TINMAN by the fall of 78 and there will be an IRONMAN beyond that. Comments and input from LTPL-C would be appreciated.

DoD HOL WG has scheduled meetings on the subject in January and June of 78. Some of the questions are how should the compilers for the language be written, should separate compilation be supported and what should the format and style of the error messages be?

By 77-December-1, DoD HOL WG has to formulate benchmarks to test designs against.

DoD/1 is the project name but so far there is no language name. One has to be selected by 78 February 1. Suggestions are welcome and should be sent to Lt. Col. WA Whitaker, DARPA, 1400 Wilson Blvd., Arlington, VA 22209.

In answer to a question, Col Whitaker indicated that typically these systems are rewritten every 3 to 7 years.

4a. As PASCAL is the base language of all the successful bids on the DoD HOL project, many committee members had expressed interest in knowing more about the language, particularly from someone who had some practical use of it. Stephen Schwarm volunteered to present a summary of the language plus some comments on his experience with it. His presentation follows.

He has been using the language experimentally for software tools and as a design language. The best users guide is the Jensen & Wirth, Springer-Verlag book, student edition.

<u>Standard Types and Operations allowed on them</u>

Enumeration(BOOLEAN,CHAR)	comparison(>,=,¬=,<)
Range(INTEGER)	comparison +,-,*,DIV(truncated),MOD
REAL	comparison +,-,*,/
Pointer(all point to type)	comparison(=,¬=)

```
FILE
SET                                 inclusion,+,-
```

Complex Types

```
ARRAY [range<,range>*] OF T

Record
     RECORD T1:T2;...     END
or
   RECORD
     CASE name: enumeration OF
     el:(name1:T1;name2:T2)
       .
       .
       .
     END
```

Statements

```
Notes: S is a statement(can use BEGIN;... END in place of S),
       B a boolean expression.
       ';' separates statements.

assignment      e.g. X := Y
IF B THEN S (ELSE S)
WHILE B DO S
FOR I := init TO|DOWNTO final value DO S
REPEAT S <;S> UNTIL B
CASE enumeration variable OF
     value1:S
     value2:S
       .
       .
       .
     END                    (most implementations support OTHERWISE)
WITH record DO S
     e.g. TYPE X = RECORD
                     B:INTEGER;
                     C:REAL;
                   END;
            VARIABLE Y:X;
     normally must say Y.B := 1
     after WITH Y DO
            can simply code B := 1 and the value of Y.B is set to 1.
```

Input/Output

```
TYPE X = FILE OF T
VARIABLE Y:X    (Y is file pointer)
(can do reset,rewrite,get,put)
RESET                        open back to start e.g. RESET(X)
REWRITE                      open empty
Z := GET(Y)                  next record, char or integer
```

```
(There are TEXT files.)
READ(F,CHARA,INT1)          looks for character then numeric fields
WRITE(F,CHARA:1,INT1:5)     1 space followed by 5 character spaces
READLN
WRITELN
EOLN(f)                     True if end of line(i.e blank)
                            False otherwise
EOF(f)                      True if end of file
                            False otherwise
```

Program Structure

```
PROGRAM name(... text files...):
  Constant section
  Type section
  Variable section
  procedures    name(parameter-list)
                   all parameters must be typed
                   all calls are by value unless insert VAR to make
                   them call by name
  functions(return any standard type).
```

Scope Rules

```
      within procedures everything but statically defined
      all implementations are recursive
 mainline program starts with
           begin
             .
             .
             .
            end.
```

Arthur: Is there reference inheritance?
Schwarm: Yes
Shorter: What about errors on I/O?
Schwarm: implementation dependent
Gertler: How does WHILE work?
Schwarm: Test is at beginning of code block.
Brewster: Is there any kind of certification/standardisation group?
Schwarm: There is PUG, Andy Micheals, University of Michigan. The language is well defined. Compilers are normally written in PASCAL. Many of them are derived from the same compiler which defines a P-code machine(stack architecture, character representation). It took us about 1 man month to get it up and running. It would have been only about 1 week if we had not run into some special problems. The language is designed for a single pass. The compiler compiled itself(4200 lines) in 12 minutes then we had a 2 hour assembly. There is a new compiler from LM Ericson which is a direct code generator.
Elzer: Why so popular? Files seem primitive!
Schwarm: Nothing special in control structures but it is special in data types and is small enough to learn rapidly.
Elzer: 48K does not seem really small! What about run time support?
Schwarm: get/put etc has to be written but these primitives are simple

and compiler breaks complex expressions down into simple ones.

Whitaker: A major advantage is that there exists an axiomatic definition.

5. Dr. Gertler gave a presentation on real time APL(see enclosure).
Note: The reported work was done at the Chemical Engineering Department of Case Western Reserve University, Cleveland, Ohio, with the participation of Dr. Adin J. Mann and Dr. Robert V. Edwards under research grants from NIH(General Medical) and ERDA.
In the discussion which followed Dr. Gertler emphasised that their objective was to select a 'reasonable' set of tasking facilities. He does not really believe that there is such a thing as a complete list. They do intertask communication using shared variables but need to modify their scheme further to allow multiple workspaces to share.

Elzer: How difficult?

Gertler: not too difficult as long as the tasking is kept simple.

Brewster: What about hardware names?

Gertler: An assembler written system routine is used to assign names. We did not want an automatic update facility for inputs.

Loper: What fixes did you do to the interpreter?

Gertler: None yet! The communication processor is implemented as a pseudo shared varaible processor and sends instructions to either the real time front end or the host as required.

Arthur: In essence then the communication processor acts as a preprocessor for the interpreter and the front end?

Gertler: Yes, that is one of the differences between what I am doing and what I am proposing.

Brewster: APL is a poor documentation tool. What about maintenance?

Gertler: I have no personal experience of APL outside this group. True <u>APL is primarily meant for the moment not for eternity</u> but if one uses functions properly can get quite good documentation.

Elzer: Should you discriminate between Hardware and Software functions in I/O? Suppose the software function migrated into hardware?
Also event handling is equivalent to interrupts so would it not be better to have a static link?

Gertler: In answer to your first question, let me clarify what we mean by hardware and software functions. Hardware functions are for example things like code conversion from an ADC or program suspension for I/O, software functions are things like corrections, conversion to engineering units, etc.

Elzer: You mean things more like 'logical' transformations than 'system' transformations?

Gertler:Yes, as to your other comment, some events are always handled by routines anyway so it seems more logical to always go thru routines.

Shorter: Why is only assignment allowed to output variables?

Gertler: Readback is really a different variable.

Shorter: But the set point is often needed!

Gertler: True that could be a useful feature.

Brewster: That can be dangerous as people confuse output value with actual value. One might well require a 3 tiered system.

Schwarm: We provide an explicit function to do a readback.

Elzer: I am concerned about the use of process variables, as if one uses them in an expression it seems as though you could get an I/O operation without realising it.

Gertler: We leave this as a user responsibilty. There has been a 10 year debate in the industry on this with no firm conclusions. We have compromised a little here as the user does have to use a special symbol.
Elzer: What about read and clear?
Gertler: I assume the value disappears once read.
Elzer: But CAMAC provides read and read and reset discrimination!
Gertler: We have not dealt with that. One could probably use a hardware function for that discrimination.

6.Joint Session on Tasking with TC1.

Elzer: IRONMAN is a good base document to work with but we have a lot of relevant internal documents to fold in to the work.
Whitaker: One must keep clearly in mind the difference between functional requirements and detail specifications.
Gordon_Clark: We have defined some necessary functions in some of the ISA standards.
The committee then proceeded to allocate the various documents against the IRONMAN table of contents. The results of that allocation are enclosed. A decision was then made to have the various subcommittees analyse these documents and prepare material from them for a new document with initially the same TOC as IRONMAN. The allocation was made by TOC section as follows:

LTPL-E evaluation criteria subgroup	1, 12 and 13
LTPL-E algorithmic subgroup	3, 4, 5, 6 and 7
LTPL-E I/O subgroup	8
LTPL-E tasking	9 and 10
LTPL-A	9 and 10 and 1, 2 and 3

(much relevant material for 1, 2 and 3 is in the past minutes of the LTPL-A).
Col Whitaker reviewed his report to the LTPL-C for the benefit of the TC1 members.
1. Evaluation of Phase 1 efforts will be the first 3 weeks in March. Representatives of the committees will be invited.
2. Benchmarks must be done by December 1.
3. 'Sandman' environmental requirements are due by December - input is solicited.
4. The language needs a name.
5. 3 economic analyses are in progress.
a. MITRE - first to be passed on - counting systems world wide, etc. Failed - crude but right answer. Benefits considered were only training, tools and technical advance. The total analysis will be presented to the management steering committee on October 20.
b. DDI - 2 portions- a decision scenario and a technology analysis in great detail. Both are being done on a desktop computer(IBM 5100)so have some problems with regard to updating and alternative scenario analysis.
c. DoD HOL WG - similar approach to DDI but on ARPA net. Really a scenario generator. Comes up with a value and shows technical benefits. Commonality shows as cost avoidance. It exists as a FORTRAN program on a DEC/10 and WG will continue to support it.

Mathew Gordon-Clark then presented the current state of the TC1 work.
A discussion took place on the difference between 'event-mark' in the

Fortran document and 'semaphore'. There was some concern expressed about the 11 parameters on the SKED routine. The European document uses semaphores but allows them to be incremented by greater than 1.

Common items were identified and can be seen in the 5 routines, CLREM, SETEM, TESTEM, PRESEM and RDSEM.

Witte: Can you do event combinations?

Gordon-Clark: No, not within Fortran constraints as event marks are evaluated to scalar integers and so an event mark expression cannot be written in subroutine but we need to think about it. Only one we have thought about so far is a single event mark plus time. The Europeans will look at more than tasking. No new work has been done on the state diagram.

Witte: Is the state diagram equivalent to a Petri net?

Gordon-Clark: I wouldn't know a Petri net if I fell over it!

Elzer: GMD(Wegner) has done work on Petri nets for these type of capabilites. I tried to introduce them to LTPL-E. Petri made a good presentation to the LTPL-E(enclosure to January 76 minutes).

Petri nets have 3 major elements - pre conditions, transitions and post conditions. The drawing for any practical problem gets huge.

Gordon-Clark: If Bruno(Witte) thinks it would be valuable to try to express the state diagram this way I would like to encourage him.

Elzer: Petri said 'such systems cannot be stable without feedback'.

Gertler: If an event is cleared by the system then it(the system) can detect reuse of the event. On overrun either automatically do one thing(neglect it or create a new activation) or give the programmer an option.

Elzer: We need to give the programmer choice.

Gertler: An event is a binary change in the physical environment which lasts for a while. The system must have a dynamic representation which can be reset even while the physical event is not reset, e.g. limit switches.

Elzer: Event marks are really for interaction between internal and external process.

There then followed much discussion of multiple events and multiple invocations.

6.1 Operating Systems

Some discussion took place on the perennial subject of whether a language such as the LTPL is required to be usable in the writing of operating systems.

Whitaker: The real requirement is ease of <u>writing</u> applications and easy <u>use</u> of operating systems.

Loper: Operating system correctness is important. We have had some requests for special data types relevant to operating systems but so far have rejected them.

Jones: There seems to be a contradiction here between the desire to allow the operating systems programmer full access to the machine resources and yet to protect against the accidental use of such features by the application programmer.

Elzer: I would like members to think about this and to please write some papers on the subject. The majority of the LTPL-E seem to feel that it can only be solved by such devices as locking off parts of the language.

Loper: That is my basic concept but I think it should be possible to do

so on a very fine level of discrimination.

7.
It was announced that Merritt Adams was willing to be nominated as chairman. There were no objections nor were there any other nominees. He was confirmed by acclamation.

8. The enclosed report to the Workshop was drawn up.

9. A question was raised(Elzer) as to whether the committee should review or discuss the outcome of the TC97/SC5 WG1 USTAG meeting. It was decided not to as that was purely an advisory group and it was clear that the US delegates to WG1 had not yet met together to review the USTAG meeting.

10. There being no other business the meeting was adjourned.

Alex J Arthur
Secretary, LTPL-A

Attendees

Name	Affiliation
ME Adams	Western Electric
AJ Arthur	IBM Corp
DE Ball	Telcom Systems Inc
A Bates	Honeywell
K Bitar	Modular Computer Systems
P Brewster	Honeywell
RH Caro	Foxboro
PE Elzer	University of Erlangen
S Fukumoto	Fischer and Porter
J Gertler	Case Western Reserve University
MR Gordon-Clark	Scott Paper
TJ Harrison	IBM Corp
RD Hawkins	Naval Weapons Center
FD Jones	Westinghouse
M Kato	Hitachi
T Lalive d'Epinay	ETH Zurich
B Levene	Texas Instruments
WE Loper	Naval Ocean Systems Center
NE Malagardis	BNI/IRIA
O Petersen	Norwegian Institute of Technology
MS Pickett	General Motors
SC Schwarm	du Pont
DN Shorter	British Steel
G Thibault	Alcan
WA Whitaker	DARPA
EJ Wilkens	Interdata
B Witte	Naval Ocean Systems Center

Agenda

0. Approval of Agenda

1. Approval of Previous Minutes

2. Reports
   1) LTPL-A
   2) LTPL-E
   3) LTPL-J

3. PLIP

4. DoD HOL WG1
   a) PASCAL

5. Real Time APL

6. Joint Session on Tasking with TC1

7. Election of Chair

8. Report to Workshop

9. AOB

10. Adjournment

Functional Requirements for LTPL
- with LTPL document allocation by section

1. General Design Criteria
LTPL-E/06, LTPL-E/063(?), LTPL-E/93, LTPL-E/171, LTPL-E/230, LTPL-E/256, LTPL-E/272, LTPL-E/278, LTPL-E/375, LTPL-E/376, LTPL-E/350

2. General Syntax
LTPL-E/309, LTPL-E/350

3. Types
Green sheets, X3J3-C283, X3J1/436, Document T, LTPL-E/048, LTPL-E/288,LTPL-E/309, LTPL-E/350

4. Expressions
Green sheets, ISA S61.1, LTPL-E/048, LTPL-E/309

5. Constants, Variables and Declarations
Green sheets, LTPL-E/309

6. Control Structures
X3J1/436, Document T, LTPL-E/309

7. Functions and Procedures
Green sheets, TC-1A-Caro 76.11.5

8. Input - Output Facilities
Green sheets, ISA S61.2(1), ISA S61.1-1976, LTPL-E/062, LTPL-E/069, TC-1A Clarke to Gordon-Clark 77.1.?

9. Parallel Processing
Green sheets, ISA S61.3(1), TC-1A Gordon-Clark 74.10.1 74.11.14 76.10.19, TC-1A Curtis, TC-1 Petersen 76.10.?, LTPL-A/42 Appendix, X3J1/436, Document T, LTPL-E/069, TC-1A Caro 76.10.1, LTPL-E/200

10. Exception Handling
Document T

11. Specification of Object Representation
LTPL-E/069

12. Library, Separate Compilation, and Generic Definitions
Green sheets, LTPL-E/069, LTPL-E/165, LTPL-E/218

13. Support for the Language
Green sheets, LTPL-E/069

LTPL-A DOCUMENT REGISTER

LTPL-A/56
77/11/07

Number	Description	Author	Date
LTPL-A/000	List of LTPL-A papers	Chair	74/4
LTPL-A/001	Minutes of March 1974	Chair	74/3
LTPL-A/002	Comments on LTPL-E/099, 105 and 129	Chair	74/3
LTPL-A/003	Response to LTPL-A/002	Chair	74/4
LTPL-A/004	Thoughts on compilers	A Morita	74/7
LTPL-A/005	Thoughts on Debugging	P Osborn	74/7
LTPL-A/006	Thoughts on Link Editing	D Adams	74/7
LTPL-A/007	Thoughts on Operating Systems	WF Sims	74/7
LTPL-A/008	VOID		
LTPL-A/009	Minutes of April 1974	Chair	74/4
LTPL-A/010	Format of LTPL-A Papers	Chair	74/4
LTPL-A/011	Distribution of Papers	Chair	74/4
LTPL-A/012	FORTRAN Equivalence Statement	P Griem	74/6
LTPL-A/013	Documentation Methodology for Structured Programs	A Morita	74/6
LTPL-A/014	Meeting Notice	Chair	74/7
LTPL-A/015	Recommended Practice Proposals	WF Sims	74/9
LTPL-A/016	Minutes of August 1974	Chair	74/9
LTPL-A/017	Some Considerations on Tasking	M Gordon-Clark	74/10
LTPL-A/018	Distribution of Papers	Chair	75/1
LTPL-A/019	Minutes, April 14-17, 1975	Chair	75/5
LTPL-A/020	Synchronisation of Concurrent Processes O Petersen ??/?		
LTPL-A/021	Proposal on Task Management	O Pettersen	??/?
LTPL-A/31	PL/I Characteristics - Configuration and System Description	Arthur	75/3/5
LTPL-A/32	PL/I Characteristics - Input/Output	Arthur	75/3/5
LTPL-A/33	PL/I Characteristics _ Language Experience	Arthur	75/3/5
LTPL-A/34	PL/I Characteristics - Implementation Experience	Arthur	75/3/7
LTPL-A/35	PL/I Characteristics - Tasking	Arthur	75/4/25
LTPL-A/36	PL/I Characteristics - Algorithmic	Arthur	75/4/30
LTPL-A/37			
LTPL-A/38			
LTPL-A/39	letter to P. Elzer - PL/I Answers	Arthur	75/3/4
LTPL-A/40	Draft Minutes, 76/4/5-8	Secretary	
LTPL-A/41	Draft Agenda, 76/6/29-30	Adams	
LTPL-A/42	Draft Minutes, 76/6/29-30	Secretary	
LTPL-A/43	Mailing List	Secretary	76/7/16
LTPL-A/44	Draft Agenda, 76/8/17-18	Adams	
LTPL-A/45	Draft Minutes, 76/8/17-18	Secretary	
LTPL-A/46	Meeting Announcement, 77/3/3-4	Secretary	
LTPL-A/47	Draft Agenda, 77/3/3-4	Secretary	

LTPL-A/48	Purging of the Mailing List	Secretary	
LTPL-A/49	Draft Minutes, 77/3/3-4	Secretary	
LTPL-A/50	Document Register Secretary 77/3/31		
LTPL-A/51	Green Sheets Revisions	Arthur	77/4/13
LTPL-A/52	Draft Minutes, 77/04/18-21 Secretary 77/5/12		
LTPL-A/53	letter to Col. Whittaker	Secretary	77/5/18
LTPL-A/54	Draft Agenda, 77/7/27-28	Adams	
LTPL-A/55	Draft Minutes, 77/7/27-28	Secretary	77/8/11
LTPL-A/56	LTPL-A Document Register	Secretary	77/11/7

Alex. J. Arthur,
Secretary, LTPL-A

MINUTES OF 34TH MEETING OF LTPL-E COMMITTEE

15TH SEPTEMBER 1976 BRUSSELS

List of Attendants

P. Elzer	Univ.Erlangen, BRD	Chairman
R.A. Bowker	Ferranti Ltd., UK	Secretary
A.F. Chalmers	GEC Computers Ltd,UK	
K-H Timmesfeld	IDAS GmbH, BRD	
G. Verroust	Univ.Paris, Fr	
J. Levy	SESA, Fr	
N. Malagardis	IRIA, Fr	
M. Kronental	IRIA, Fr	
J. Robert	CAP-SOGETI, Fr	
A.J. Skinner	DEC, UK	
W.E. Quillin	Plessey Ltd, UK	
I.C. Pyle	Univ. York, UK	
R.F. Maddock	IBM, UK	
N.V. Jones	HPA Ltd, UK	
C. Hopmann	GMD-IST, BRD	
I.C. Wand	Univ. York, UK	
H.B. Williams	MBP, BRD	
A. Wild	Ferranti Ltd, UK	
M. Inderst	ESG, BRD	
J.L. Badault	ECA-Automation, Fr	
M. Helfert	Univ. Stuttgart, BRD	
G. Bianchi	CEA-SACLAY, Fr	
J.B. Franck	STERIA, Fr	
N. Jordan	KENT Automation, UK	
R.M. de Morgan	Dataskil Ltd, UK	
J.G.P. Barnes	ICI Ltd, UK	
E. Wegner	GMD-IST, BRD	
H.F. Harte	Software Sciences Ltd, UK	
H.J.F. Neve	RSRE, UK	
C.H. Smedema	Phillips Research Labs,Netherlands	
P. Parayre	CPM, Fr	
J.W. Roberts	EWW, BRD	

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Technical Plenary Meeting 16.9.76

After chairman's welcome the agenda was begun.

T1. Approval of Agenda

The chairman added an item B5: Approval of self representation. Old B5 becomes B6 etc.

Item T4 had to be removed. A description of ILIAD should be sent for all A-list members.

Mr. Roberts suggested discussing distribution problems. Postpone to A.O.B. Business Meeting.

Mr. Chalmers raised question of distribution of August planning group proposals. Chairman suggested taking this under B2.

The chairman asked new members to introduce themselves.

Two new members. No representative of DOD.

T2. Description of MORAL/Mascot

Harte: The MORAL manual will be distributed to the subgroup chairmen so the technical content of Mr. Harte's presentation is not fully minuted. Only the discussion is minuted, in detail.

MORAL means MASCOT oriented reliable applications language. It is designed as a high-level language near the level of Algol-68 but which translates into CORAL-66, which accounts for some features. A Mascot system is a system of parallel activities communicating via unprotected POOLS (for e.g. read only dictionaries) and protected CHANNELS which allow for synchronization. Synchronization is via "control queues" which are sema/event devices with 4 primitives, join, leave, wait, stim. (= secure, release, wait, signal).

The idea of having MORAL is basically to have a clean interface to the MASCOT control structures.

MORAL has a LOCK facility (illustrated in the example) allowing elements within a group to be protected from access outside the group. This can be a total ban, for protected data needed only by procedures within the group, or partial in which case the correct key must be presented by the accessing procedure. GROUPS are more than Algol-68 STRUCTS, since they can contain procedures, but they are not full monitors since they don't automatically exclude one another. The enclosed example shows the use of the Mascot primitives in MORAL.

T3. Presentation of Paper 351 on Modula

Ward: Unfortunately, Paper 351 has not been distributed. MODULA is a new language developed by Pr.Wirth for Process Control on small computers. MODULA is related to PASCAL with similar data structures. It is a smaller language with parallel features. Each module must be specified with all names used from outside and all used inside the module. Objects are sometimes 'imported' from an external environment into a module and v.v. Task creation is only at the main module level. Interface modules exist (similar to MORAL groups) and Device Modules for encapsulating device dependent features. No SET type and no Pointers of any sort. Simple control structures with specific bracketing symbol for each. No GOTO. CASE, WHILE etc.

Synchronization is by signals with primitives wait, send and awaited. MODULA implemented nowon PDP11 and has machine dependent elements which would need changing on a different host. All i/o done by a DO IO operation.

Language is not now suitable for applications (no real arithmetic, file i/o). The solution for the double-buffer problem is in paper 351 and comments are invited. MODULA is the kernel of an algorithmic language with certain interesting features for LTPL.

T3. Discussion on T2 and T3

Hopmann. Idea of splitting up systems is very old. Are you aware of work of Lower at Newcastle Univ. on Petri nets? With many Petri nets can get interference between modules even with correct interfaces to environment. MORAL seems not to counter this. Are you aware of this?

Harte. Effect can only be by semantic information going down channels.

Hopmann. This can cause information about internal structures to go into the network, so that the network is still tied to the internal structure of the channels.

Wand. How to error messages work out with 2-levels of compilation?

Harte. We aim to produce correct CORAL-66. This is possible with a validated compiler.

Timmesfeld. Relations between queue and secured variables is only in the programmer's head, i.e. no automatic checks.

Harte. This is true. The synchronization must be tested by hand.

Timmesfeld. Scheduling/task activation not in language?

Harte. Correct. Done by underlying MASCOT.

Pyle. What is completion state of MORAL?

Harte. 95% complete translator under test at RSRE. Then Revue of language around 1977.

Pyle. Can you have code inserts?

Harte. The language will not have them.

Pyle. What is size of kernel?

Harte. Less than 1000 words.

Wand. MODULA is 105 words.

Pyle. What happens to unwaited STIMS?

Harte. Queue has 2 states 0 STIMS - 1 or more STIMS.

Pyle. Can you test if any task waiting on queue?

Harte. No.

Elzer. I'm not sure exactly what the LOCK does.

Harte. LOCKS are compile time checks to allow programmer to declare his intention which can be checked by the compiler. A field can have multiply keys at declaration but only 1 key allowed on access.

Elder. How are run time errors handled.

Harte. In Mascot, whole network must be defined at system design stage. No operating system. Some errors trapped and signalled on console.

Elzer. How about i/o?

Harte. Have interrupt control queue similar to control queue where a device interrupt corresponds to a STIM. Primitive handler must be added to kernel for each device added to system.

Elzer. Is it not inconsistent to force user to use assembly code for input output with high-level for other areas?

Barnes. Are waits timed-out?

Harte. No, but a timer exists so you can do it yourself.

Barnes. What about subscript errors?

Harte. In MORAL, array bounds are part of type.

Elzer. How is the design diagram transformed into program form?

Harte. The design diagram is produced as an early design document. No automatic translation exists between diagram and procedure structures.

Elzer. Are the interface modules of MODULA monitors?

Wand. Not quite, more than one process can be in an interface module.

Pyle. MODULA suffers from length in solution to double buffering as does LTPL. This is because of amount of detail in example.

Harte. I will produce solution, in MORAL.

Elzer. If such a basic problem blows up into such a lot of code surely something is wrong.

Timmesfeld. I don't agree. Just because a problem sounds simple that doesn't mean that it is simple, so a long solution may not be a bad thing.

Wand. The MORAL language looks ugly. Is this deliberate? Or is it just me? How big is system?

Harte. Perhaps you're too fond of PASCAL type notation. Size of MORAL translator - 32K. 9000 lines of CORAL Kernel - 1K + monitor + mechanisms of systems elements file. Not fully developed so I can't give size of all elements, runs on Modula 1 with 32K + discs with overlaid compiler.

Before the individual group reports, the chairman mentioned that the Technical Advisory Committee, consisting of government sponsored delegates appointed to advice EEC on LTPL projects, has asked that the subgroups produce "snapshot" state-of-the-art reports on the work of each group.

T6. Report of Algorithmic Subgroup

Chalmers: Our response to TAC request is:

i) Latest version of our state of the art report.

ii) Discussion of where we go.

The first is readily available but we cannot say exactly what the second will consist of. Available state of art report is that current June.

Meeting attended by 5 regular + 1 new members. Dr.Gilbert could not attend due to pressure of work.

First topic was approval of latest state of art report which was approved with minor edits. This will go to all A-list members.

One point we want to refer to I/O group namely 4.1c concerning extensibility: Extensions allowing definition of new modes/procedures to use previously inaccessible features of hardware.

Second topic: detailed review of LTPL 219 Algorithmic Kernel. This had not been adequately discussed. Prior to the meeting a questionnaire had been sent to all members, and the results were collated and at the meeting we tried to resolve differences. We agreed to accept 44 points, to delete 2 and 34 are still undecided. In the course of the review, some edits to 219 were agreed. Results will be in next issue of State of Art report. Two main reasons for deferrment:

1) Could not reach agreement.

2) Needed opinion of I/O subgroup - concerning external references part of para 190, para 350 and part of para 680.

Deferred points grouped into topics:

a) Pointers and subscripts.

b) Bit addressing.

c) Equivalence.

d) Macros and text processing.

e) Re-entrancy

f) Boundary between compiler and rest of system.

Position papers have been assigned for a),b), c) and d). This will be discussed at the next meeting, in line with the usual practic. Also State of Art report will be updated. Still not got a PEARL expert on group. Mr. Heger was not there.

<u>Elzer.</u> How will State of Art report be produced? Do you plan another meeting?

<u>Chalmers.</u> Intend to distribute June '76 State of Art Report unless meeting possible in November.

<u>Elzer:</u> We have most paid sessions of any TC and cannot have a funded session. So either we have an unfunded meeting around November or wait till January. Your plan depends on date of next meeting?

<u>Chalmers.</u> Yes. If we have meeting in November, we could check September report.

Elzer. We additionally need a critical analysis of the state of the art. We need something more suitable for the TAC. Not just technical details.

Chalmers. I thought they just wanted one document listing all the agreed points.

Elzer. We need some idea of plan of work, resources needed etc.

Chalmers. This is set out in the study proposal for the Algorithmic synthesis. Could you send a copy of the TAC minutes to subgroup chairmen?

Elzer. Minutes not detailed enough.

Skinner. A state of the art history is not a status report, which would contain an assessment of how far we have got, what must be done etc. I think that a standard structure should be decided for each report.

Chalmers. The problem if I have to do a critical assessment is that my views may not be the view of the group as a whole.

Elzer. This discussion must be postponed. Any technical questions?

Timmesfeld. Has any discussion been given to included types like DEVICE etc?

Chalmers. No.

T7. Report of Tasking Subgroup

Timmesfeld: 7 memberspresent. Secretary selected for minutes to be sent to other chairmen, Mr. Skinner of DEC.

First item: Discussion on schedules, based on paper by myself. Main proposal to identify schedules as items in the languages and to be able to collect and delete schedules within the language. The proposal was generally agreed. Mr. Jones main critique was syntax rather than semantics.

Second: Paper on interruptability of parallel activities by Badault et al comparing LTR no-interrupt except at selected point approach with LTPL approach of interruptability at any point. General opinion was LTPL is more general approach. LTR approach cannot be used in LTPL since it is defined only in terms of a single processor system.

Third: Discussion on distributed intelligence. We tried to formulate definition. Multi processor systems not regarded as distributed intelligence whereas multi computer system would be. Intelligence implies general programability. Thought of impact on tasking/I/O. Thought we might have restrictions on tasks running on different processors e.g. only communication by messages.

Discussion on whether code or commands to remote operating systems should be transmissible as messages. Comments to be brought to next meeting by Dr. Wand and myself.

Decided that the subgroup chairman must produce state of art report based on LTPL 243 taking later development into account.

Then discussed role of tasking subgroup within CEC project. Task subgroup consider themselves as a body responsible to decide between proposals put forward by Contractors.

The following formulation was produced as a proposal for a working relationship for the first work items:

A minimum of 2 checkpoints in contract to allow review. Each review is meeting between Proj.Manager Contractors and committee subgroup (timed to coincide with meeting of LTPL).

The first check point will review the following:

1) Style of definition to be adopted.

2) A formalised scope definition.

3) Difficulties, contradictions and possible solutions detected so far.

A written report covering the above should be circulated one week before the meeting. The checkpoint might take place two months after contract start.

At the second checkpoint (3 months after 1st) first draft of whole definition should be ready. This should be circulated two weeks before the meeting and the checkpoint will comprise detailed review.

The group will indicate where further material should be included or considered and will approve the scope of the definition document and its style.

A discussion followed on what chance the rule of the tasking group would have of being adopted or even considered by CEC. Dr. Timmesfeld pointed out this was a proposal for technical co-ordination which could be accepted or rejected. M.Robert felt that these proposals were beyond the terms of reference of the Tasking subgroup or even LTPL. We need project management rules but this should not be decided by Tasking group. The chairman asked about compilation of status report.

Timmesfeld. Will be produced in November by myself and distributed to all members. Agreement will be reached by correspondences if no meeting this year.

Badault. Disagree that LTR is single processor. In fact multi-processor systems have been sold using LTR.

Timmesfeld. Cannot have uninterruptability with many processors and one store.

Badault. This is true if only one store. Need at least 2 stores. M.Kronental can give French view on tasking.

Kronental. This is still in draft form and is not the official French view as such. It will be translated and presented at this group.

Badault. Does Tasking group intend to take the paper into account?

Timmesfeld. I can't comment since I have not even looked at it.

M. Kronental agreed to circulate the paper in French to all A-list members.

Jones asked what happened to Mr. Schweizer's proposal to gather information on distributed intelligence.

Elzer. I met him at TAC. By an error he was not invited to this meeting and in any case he has much work due to having changed jobs.

T8. Report of i/o subgroup

Verroust: 7 members in attendance.
Presentation on new PEARL I/O by Dr. Hopmann.
A deeper discussion will follow receipt of written report.

New discussion on process variables. Decided not to do i/o this way. Then discussion on i/o study put forward by planning group. General approval expressed. Need for close relation with contactors and standardised terminology.

Discussed criteria for contractors. We think that suitable contractors could be found.

Regarding TAC request, Paper LTPL 303 will be expanding to fulfill request.

At next meeting Dr. Wild will present CORAL i/o, also discussion of IPL I/O and also we will start on standard terminology and TAC snapshot. Now also we plan a short joint session with Algorithmic Group.

Main problem we bring to plenary is need of terminology standard if many contracts will be placed. Intend to use IFIP/ISO terms, not invent new ones.

Elzer. I assume that you are assuming another meeting this year? Mr. Hopmann knows of work on terminology standards.

Hopmann. ISO subgroup working on standard terms for input output.

Chalmers. Will results be available in time?

Hopmann. German standard exists for Operating Systems and draft-standard for concurrency etc. The working of the national standards organisation is part of the revision of the ISO data processing glossary.

Verroust. We need a set of English terms. I think we must use IFIP document and any other useful books.

A discussion followed on which terminology should be used and how we can avoid a divergence between LTPL terms and some future standard which might later be imposed upon us. No firm decision came out but the chairman requested all subgroup chairmen to consider problem.

T9. Report of Evaluation Criteria Subgroup

Levy: 5 members + Mr. Socol of U.S. Army.

Not much work done up to now. Concluded evaluation criteria strongly related to design criteria which in turn are strongly relating to functional requirements. So we need functional requirements. A number of lists exist and it is a lot of work to process all the papers on this topic. This has been proposed as a project within CEC. Cannot be done internally. Work detailed in Project Proposal Document.

Regarding snapshot report. Very difficult now, so we may try doing the work of the contractor in a very sketchy way and draw up a small precis, and add a section on the plan of work in outline.

Must ask other subgroups to input the design criteria they are using. Also discussed how we could interact with EEC Project. General rules agreed. I would say Tasking Group ideas in this are too detailed and unrealistic.

Our meetings are every 3 months so we cannot follow a contract closely. Day-to-day problems must be done by a project leader. We must give advice to project leaders and give after-the-fact reports and opinions on work done and papers produced.

Had general discussions on learnability, ease of use etc.

Also decided that one way to judge functional requirement is by sample problems, e.g. double buffer problem. We would like to receive sample problems with or without solutions.

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Elzer. Good idea for other groups to make explicit their design criteria. Does the group plan to start where the previous one left off?

Levy. Don't think there can be real continuity. Two types of activity up to now:

1) Structuring of work. This structure has now been rejected.

2) Discussion of various topics which will carry through into the new group.

Elzer. What about going through papers for functional requirements other than "Green Sheets". Other papers exist from later meeting.

Levy. A contractor would be needed to analyse the existing data. 2-4 month effort is needed. I can only list the relevant papers. The state-of-art report will be written by myself, circulated by post for correspondence and then redrafted to take account of criticisms.

Pyle. Evaluation criteria are not just related to technical usefulness. Feasibility and acceptability must be considered.

Levy. Yes, we agree that these criteria must be taken into account.

Regarding terminology, I suggest that LTPL glossary which has been produced by ISA be used.

Elzer. Now I think we must close session. It seems that requirements for status reports are not clear. I suggest a short discussion with M. Malagardis and the subgroup chairmen.

Meeting resumed at 9.00 a.m. 17th September 1976

T10. Discussion of Tinman comments

Elzer. Collected comment under LTPL-350 and again with corrections under 350a and again under 350b. All members have this and it is also in draft minutes. Pr.Pyle took over as chairman for this item. He reviewed the papers relevant to this for members to check that they all have been sent. A request for further comments was issued and Mr. J. Barnes agreed to supply one.

Chalmers. Attempt was made to get Warren Loper to give information about comments made at Zurich without any success.

Neave. Closing date for comments was June. What will happen to comments?

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Wegner. Next step is Cornell meeting at start of October. Comments produced quickly could still be processed.

Pyle. Only input to Tinman if communicated in time, but in any case they are input to LTPL.

Badault. Respecting criteria of feasibility and acceptability, I think Tinman will be too large and complex for LTPL. We must simplify.

T11. No matters raised.

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Minutes of Business Meeting 17.9.76

B1. Approval of Minutes

It was agreed that the Collected Subgroup discussion in minutes will be replaced by a reference to paper 350b. Areas in later discussions where clarification was unsuccessfully sought from Fisher will be numbered to enable later inserts.

M. Robert suggested that the other part of the Tinman discussion be moved from the minutes into paper 350. Also Mr. Barnes' comments will be ready mid-October for incorporation into 350.

Problem of January and Zurich minutes was raised again. Still not distributed in final form. Chairman agreed to contact Dr. Dietrich who was indisposed and unable to attend the meeting.

Robert. Last meeting decided all authors should distribute own papers. Need to spread load, as regards printing and distribution.

Pr. Pyle volunteered to arrange distribution of 32nd meeting but a problem of collection of information exists. Written comments on 32nd meeting were given to Mr. Chalmers who accepted the task of printing and distribution.

Wegner. All missing papers were mailed to Dr. Dietrich at his private address 2 months ago.

Elzer. This means material all exists.

Additional item: Mailing list check. Some inaccuracies had come to light.

B2. Report of planning group

Elzer. On 15th September the TAC (Technical Advisory Committee) met for first time. This was formed by suggestion of Mr. Layton to advise the EEC on LTPL work. The committee consists of government appointed delegates and advisory experts. The LTPL chairman attended the meeting, which was chaired by Layton.

Three items on agenda:

1. Charter of TAC and relations to LTPL-E.

2. Comments on technical papers prepared by EEC and LTPL committee.

3. Data Exchange with DOD.

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A Mr. Socol of U.S. Army attended this, thinking that the LTPL plenary was on that day.

Regarding data exchange, Mr. Socol saw no difficulty though a formal system would take time.

In Planning group discussion, dissatisfaction was expressed that the U.S. do not reply to requests for information, so that communication is "one way". This was generally felt. Mr. Socol thought this might be due to lack of co-ordination rather than lack of willingness. Mr. Socol has been asked to do liaison role. He noted the dissatisfaction with the communication from U.S. to LTPL.

Further problem with Cornell Univ. workshop. Names given to Dr. Fisher. A letter was given to LTPL Chairman as tentative invitation. Invitation received on 5th September to LTPL Chairman but not to Pardue Europe. This situation needs to be regularised.

<u>Malagardis.</u> More needs to be said about method of selection of LTPL members. This has been done without reference to LTPL committee. This effectively inhibits co-operation.

<u>Skinner.</u> What is purpose of co-operation?

<u>Malargardis.</u> At least exchange of information which is not being done.

Mr. Harte pointed out that this discussion belonged under B4.

Back to TAC meeting.

<u>Elzer.</u>

1. Self-understanding of TAC.

TAC want broader scope than LTPL with no upper limit on breadth except for not impinging on CREST Informatics Committee.

M. Malagardis explained that CREST is a CEC body set up to look at research projects. Currently has done research on networks leading to formation of EIN. Subgroup on Informatics has list of topics to be investigated and proposed, including Real Time Languages. J. Noyes suggested joint CREST/TAC meeting to sort out respective spheres of interest.

<u>Elzer.</u>

Meeting discussed relation of TAC, LTPL, Project Leader etc. TAC was to be advisory body to Project Leader with official status with right of guidance and control of Project and Project Manager. LTPL is advisory group used at request of Project Manager for technical advice.

On Data Exchange, agreed that LTPL should have a say in form of exchange.

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2. Discussion of papers.

Discussion on Project Plan and the planning group document on Initial Projects. Some discussion on question of degree of correlation of projects.

M. Malagardis took the chair at the TAC meeting for the discussion of the paper on Initial Project Proposals. It was pointed out that this represented some divergence from the project plan. The committee were told in reply to this that this divergence was not great and was within spirit of the project plant.

The Initial Proposals has a horizontal and vertical structure. Horizontally they include studies for language skeletons which are overview studies of the language as a whole which are needed to ensure cohesiveness between studies in different areas of the language.

4 skeleton studies proposed:

1. Language comparison synthesis.

2. Skeleton in spirit of LTPL-219.

3. Skeleton in spirit of Simula Pascal.

4. Study in very-high-level languages translatable into other high-level languages. Somewhat like MORAL.

At vertical level are the elements of work of each of the subgroups, for which studies have been proposed.

The Evaluation Criteria work is viewed separately and it is desired to produce a requirements document and a study is proposed for this.

Lastly, it is suggested that contracts be given to collect sufficient sample problems which will enable the language features to be evaluated. These problems should not be submitted by the language designers. They must be done independently to ensure they are not just biased to any language.

There was criticism of this document. A minor criticism was that only LTPL documents were referred in paper 314.

A major criticism was levelled at the suggestion that contractors should be chosen amongst those familiar with the ongoing work of LTPL. Some members felt this was setting up a closed shop. Also criticism that effort estimate not high enough to be realistic. This was answered by saying that this was only introductory work, not the whole thing.

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A surprising opinion was expressed that LTPL was too academic biased and a complaint was made on lack of readily assimilatable information.

TAC requested a short report from each subgroup detailing achievement so far, problems, hopes, fears etc. Funding depends on these. TAC next meeting on 22nd October and they want to see LTPL Self Representation document as soon as possible.

Meeting of higher officials group on 24th September which will again discuss the monetary framework. It is hoped it will go before Council of Ministers at end of year.

The question of separation of LTPL from its connected projects was raised (see 33rd minutes). M.Robert pointed out this comes under B3.

Robert. Planning group has had 15 hours of meetings counting the special meetings. This special meeting has not been fully reported and this is a general problem. For instance planning group minutes are produced but not distributed.

Elzer. A brief report then can be given. At 33rd meeting it was agreed that on 9th-11th August a special meeting of planning group should take place to set out proposals for initial proposals. This took place and paper has been given to TAC and to Planning Group members.

Robert. Even if the report 314 is distributed, any discussion in the plenary will be too late.

Elzer. This will be discussed later. Planning group agreed we must speed up self representation of LTPL. IFIP group 5.5, it was discovered, is working in the same field as LTPL and this was being investigated.

Mr. Hopmann reported on PLIP. First meeting at end of this year in Washington (November). Three papers already input to PLIP. A proposal for Process FORTRAN will be put forward by ANSI. Also PL1 standards group for Process Control has been revived.

Then some discussion on importance of Tinman, problems of communication etc. This was the last item.

To return to main issue of the proposals for initial contracts. It was agreed that planning group would discuss this. These will be distributed to all A-group members.

Robert. Must point out that these are drafts not for TAC meeting (which we didn't know about) but for September meeting as extension of Project Plan.

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Bowker. I was hoping that some discussion would have taken place on these proposals at this meeting and and the documents would already have been distributed. Now it appears that no discussion can take place before January (probably) which is too late to be meaningful.

Elzer. I intend to distribute it so it can be discussed at next plenary. The situation is not so bad as has been suggested.

1. TAC group will modify certain aspects.

2. I ask for written comments. None received so far.

Necessary then to extend this plan.

Bowker. What is procedure for approval?

Elzer. Normally will be approved by full meeting. Problem is fluid situation. It is difficult to get agreement.

Robert. Amendments to proposal are of 2 types:

1. Amendments to existing proposals.

2. Additions to proposals.

No pedantic comments should be made.
Need for expansion of all modules in first 2 years.
Extensions are the more important.

Badault. 2 problems:

1. Approval of proposals.

2. CEC timescales.

I suggest a meeting in December to clear this up.

The chairman then suggested that item B6 be brought in, in view of this.

B6. Next meeting

Elzer. No real possibility of another paid meeting. Do we agree to have a meeting in beginning December?

Robert. I suggest we have 2 more meetings before Zurich. Late November/early December and another in January/February 1977.

M.Malagardis pointed out, for information, that the next full Purdue Europe meeting may be at Ispra in Italy.

After some discussion it was agreed to have an unsponsored meeting on 7th December 1976 9.00 a.m. to 8th December 1976 12 noon at IRIA, Paris with planning group at 1800H on 6th December.

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B3. Approval of Self Representation

Elzer. I had hoped that self-representation would cause no problems. Paper 341A has been written and amended more than once. It appears that Pr. Pyle still feels one alteration.

Pyle. I don't want to hold back circulation due to my comment, and I think it is too late to start discussion now.

Wand. The comment came from 2 U.S. visitors querying whether PL1 style was necessary. Their opinion was that PL1 style might even hinder the acceptance of LTPL.

Pyle. Therefore the sentence: "LTPL will be a companion language to PL1 in the same way that CORAL is a companion language to Algol-60" might not help the acceptance of LTPL. Perhaps we should leave it in and wait for comment.

Wand. I suggest the sentence be struck.

A vote was taken and the motion that "the sentence be struck" was carried by 14 for to 11 against with 4 abstentions.

Second motion proposed was that "That in view of the necessity of presenting LTPL to TAC, the paper be published before 1st week of October with the amended just passed".

Passed unanimously.

The chairman expressed the hope that this vote does not imply any total rejection of PL1 or any relation between PL1.

Some discussion followed on what implications might be drawn from this vote, and Pr. Pyle suggested that an item should go onto the Agenda of the next meeting in the Technical Session so that the attitude of the Group towards PL1 could be clarified. Mr. Elzer supported this suggestion.

B3. Discussion on status of EEC projects

Jones. Will precise terms of reference of TAC be published to members?

Elzer. The terms of reference are still not clear. When information is available, it will be sent.

Timmesfeld. The question of the relationship between LTPL group and CEC and contractors was postponed to this meeting.

Elzer. I remember there were two opinions on how to influence CEC on this matter. One was tasking group with firm detailed interaction proposed. On the other hand, the Evaluation Criteria Subgroup thought that close liaison would be impracticable.

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Timmesfeld. Different views may be due to different work items. Evaluation project is primarily gathering information whereas tasking group implies many technical decisions and so we need closer liaison.

Elzer. Contractors welcome additional complications due to greater possibilities of slip-generation. I think these complex interactions will complicate things too much.

Timmesfeld. Alternative is that result of contract will not be suitable.

Skinner. Could this not go onto Agenda at next meeting. Not practical to discuss it now.

B4. Relation to US-DOD Project

Robert. Not only problem with DOD but LTPL-A also do not give information.

Elzer. LTPL-A internal organisation problems could account for their silence.

Robert. LTPL-A meetings are going on and reviving idea of PL1 for Process Control. Not enough of this is communicated.

Elzer. LTPL-A send minutes of meeting to myself.

Robert. But minutes were agreed to be sent to all LTPL A-List members. Certain people, myself included, were appointed as distribution points, but in 3 years I received nothing.

Elzer. Main problem is relation to DOD. Problem is lack of communication from DOD and that Data Exchange is only one-way.

B7. Preparation for Purdue Workshop

Elzer. Main topic is production of combined Tinman comments, of all LTPL-C. So all possible comments must be sent in detail.

Also I want to investigate what is going on with PL1 and talk to DOD.

Pyle. My comments are personal and may be presented but not as in any way representative either as LTPL-E or algorithmic subgroup.

Elzer. I will assume that all comments should be viewed as personal.

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Robert. Only proper point of contact with U.S. is via LTPL-C. Americans work through ISA or ANSI and seek to impose on others. We must have discussion at international level, votes are no use if we are not involved in discussion. We need to put forward rules of good conduct.

Elzer. Could M. Malagardis write to Pr. Williams pointing out difficulty of working with U.S.?

It was pointed out that the U.S. habit of short-cutting LTPL in any important development is rather typical of human nature which was somewhat beyond the scope of LTPL. Little, it was thought, could be done about it, and M. Malagardis felt it was not appropriate to enter into controversy with U.S. or Pr. Williams on this matter.

B8. Any Other Business

No items required discussion.

Meeting closed at 1230.

MINUTES OF THE 36TH MEETING OF LTPL-E

31ST JANUARY TO 2ND FEBRUARY 1977

List of participants:

P. Elzer	Univ. of Erlangen	Chairman
R.A. Bowker	Ferranti Ltd.	Secretary
E. Wegner	GMD	
A.F. Chalmers	GEC	
W.E. Quillin	Plessey	
J.D. Ichbiah	CII Honeywell Bull	
H.D. Williams	MBP GmbH	
J.W. Roberts	MBP/EWW GmbH	
J.G.P. Barnes	ICI	
A. Skinner	DEC	
R. De Morgan	Dataskil	
T. Golborn	SDL	
G. Cohen	CERCI	
T.J. Froggatt	Univ. of York	
N.V. Jones	HPA	
M.E. Helfert	Univ. of Stuttgart	
M. Inderst	ES GmbH	
K.H. Timmesfeld	IDAS GmbH	
S. Savoysky	LCPC	
J. Robert	CAP-SOGETI	
G. Verroust	Univ. of Paris	
J. Teller	Siemens AG	
R.F. Maddock	IBM	
N.E. Malagardis	IRIA/CTI	
M. Kronental	IRIA/CTI	
W. Teasdale	AERE Harwell	
R. Gilbert	AERE Harwell	
P. Deschizeaux	Univ. of Grenoble	
D.C. Rummler	Office of Naval Research (US)	
O. Dietrich	CEC.	

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Plenary Meeting Minutes — 36th LTPL Meeting

1st February 1977

Meeting open at 1400 hrs. with welcome by Chairman.

Approval of Agenda

Unfortunately, some members had not received agenda although it was posted 19.1.77. It was noted that for UK at least, 14 days postal delay is usual.

No alterations to agenda were made.

Introduction of new members

T. Froggatt	Univ.of York. Work in real-time language design at York. Tasking Subg.
W. Teasdale	AERE HARWELL. Working on distributed systems and networks.
G. Cohen	CERCI paris. Languages & Compilers.
T. Golborn	SDL. interest in Coral/Pascal.

Apologies for Absence

Apologies for absence were received from:

I.C. Pyle
I. Wand
J. Levy
H. Harte

Attendance for Christian Rovsing, the Danish firm, will in future be by Mr. Steen Hansen, Mr. Hvidt can no longer come.

RSRE England can no longer attend, so Mr. Nieve will not be coming. This is due to pressure of work and the unavailability of experts with the right background.

Report of Algorithmic Group

Chalmers

Attended by 9 of the regular members. We also had a joint meeting with I/O. Started with minutes approval and actions review.

Main item was those algorithmic kernel features deferred due to disagreement from previous meeting, viz:

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1. Pointers and references
2. Array Dimensions
3. Common access and equivalence
4. Source - text processing
5. Bit addressing and packed data.

As regards pointers and reference it was agreed:

Algorithmic kernel has qualified pointers only. Maybe full language will contain unqualified if needed - for system programming. There shall be variable selectors with either explicit tag assignment (efficient, unsafe) or implicit through assignment of aggregate assignment. This alternative is still open, with a paper to be done by M.Ichbiah. Some safety questions still open.

As regards bit addressing and packed data:

Handling of packed data is done by declarative means not by statements. Packed data structures should be declarable as well as sets and/or arrays of (possibly single-bit) Booleans. State-of-Art report will be modified to exclude single bit variables and type bitstring.

As regards discussion with I/O group, we discussed only the question of language extensions. The Algorithmic group proposed:

1. Algorithmic kernel must be powerful enough to define I/O as a natural extension without any kernel extensions.

2. Standard I/O will be defined as part of the LTPL definition.

3. I/O in the kernel will be by procedures. The full language may contain higher level constructs (e.g. Formats).

R. Gilbert will update State-of-Art Report.

At ISPRA we will discuss, 3 outstanding points, plus M. Deschizeaux paper on synchronization plus Papers by I. Pyle on State-of-Art Report, array dimensions and static data sharing.

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Kronental

CII Algorithmic Paper available soon in English. This needs a number.

Number LTPL-E/373 was assigned.

Elzer

Kernel I/O by procedures is not high-level enough. This needs more discussion. A language contains many types of data and devices, all of which have peculiar properties so that not all data can go to all devices. This needs checking which cannot be done by procedures.

Timmesfeld

This implies unions, will these be in LTPL?

Ichbiah

First, we have not reached decision on unions. Second, SIMULA does not support unions but has good procedural I/O. I think we cannot discuss this now and I think we need papers setting out objections.

Elzer

Limiting plenary discussion will cut out people's ability to make objections. This is too important to limit discussion.

Bowker

Does I/O group really agree to subroutines only?

Verroust

This question will be covered by my report.

Elzer

I do not want this decision to be taken by one group.

Ichbiah

Since Elzer and Timmesfeld clearly have important points on this problem, I think they should prepare a paper.

Elzer

Certainly there are clear problems with only having procedures and if a procedural interface is chosen, the reasons for this must be clearly stated with arguments for and against. Also question of extensibility is still outstanding.

Timmesfeld

In order to pass needed information by a parameter, this parameter must have various possible attributes. This implies unions. Do we want these for all of LTPL?

Roberts

In Algol-68 the parameter mechanisms has been shown to be inadequate, without special types for procedures only.

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Wegner

Maybe unions are not needed, but other features are which are needed for I/O only. For example : multiple procedure entry points, local data preserved from one call to another.

Robert

It is advantageous for the compiler to generate code for I/O because of lower chance of error in sequence. This does argue for a higher level construct. I think that either high-level only or low level only is wrong. Why not both types which both have applications?

Teller

We need some mechanism for extensibility for new devices. So we need a flexible system. An example is a laser-printer which can, for instance, change the character font.

Ichbiah

If a new device comes along which does not fit the statements available then the compiler must be modified. It is more preferable only to have to modify library.

Elzer

This is true from vendor's point of view but not from users.

Timmesfeld

Generally, of course, we should avoid change to compiler. But in any case, a new device will need a lot of programming effort of some sort, and a compiler change may not be so much larger in terms of effort to justify excluding I/O statements.

Robert

Devices may be, in fact, a complete computer system with many possibilities and perhaps communication via message passing. In this case we can use existing devices (CALL, TRANSMIT) but in this case there is no possibility to syntax check. This checking is not usually in the Operating System, so that checking can only be with higher-level I/O.

Report of I/O Subgroup

Verroust

First we had discussion to prepare for joint meeting with Algorithmic Group.

1. Problems and nature of language extensibility features.

2. Uses of language extensibility in I/O. Long discussion on graphic I/O including problems of remote graphic computing.

3. Use and problems of a format feature in a language.

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Statements agreed at the meeting were:

1. Kernel must be able to define all I/O facilities without requiring additional features.

2. Together with language definition, standard I/O facilities in terms of LTPL will be published.

3. Later, the facilities may be extended to higher level facilities (e.g. formatting).

Provisional agreement on these three sentences still need further agreement on:

- Data types in Kernel

- List processing

- Level of LTPL, i.e. distance between LTPL and machine interface.

Next we started building a set of LTPL I/O features starting from language comparison manual. Then we had discussion on TC8 relations. We need:

- to define features needed to call an operating system Real-time.

- to settle interface between compiler and operating system.

Then discussion on terminology. This was in response to paper by I. Pyle. We are not prepared to become a terminology subgroup but obviously we will clarify terms used in our work.

Finally discussed LTPL-E/361, a paper by LTPL-A, which contains a section on I/O.

Elzer

I can see a problem with so many joint meetings. What about further meeting with Algorithmic Subgroup?

Chalmers

Impossible at ISPRA, due to shortage of session time.

Elzer

Can I/O group prepare list of primitives and give it to Algorithmic Subgroup so they can describe them according to their proposals? How far has this work gone? When could such a paper appear?

Verroust

Maybe June or September. Must be discussed in June.

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Elzer

Is I/O group synthesizing I/O from the Language Comparison? Can I/O group produce a unified position paper on I/O?

Verroust

Yes to both questions. But Language Comparison document is partly out of date and other sources are used.

Timmesfeld

It has been asked for groups to hand over evaluation criteria. Are other groups doing this?

Chalmers

We have a feeling that Eval.Crit. should come from outside. Think that Tinman should be source.

Timmesfeld

Evaluation Criteria needs input to avoid working in vacuum.

Elzer

Each subgroup has worked according to implicit design criteria.

Bowker

But I believe that no agreement exists on priority.

Ichbiah

This group has not the manpower to make a serious effort on evaluation criteria. Therefore we can only define ourselves relative to Tinman and even this represents a lot of work. We cannot possibly do better. It is sad but true.

Elzer

This would be job of Eval.Crit. group, but they are not here to-day.

De Morgan

M. Levy was going to send papers but did not.

Elzer

We have now got onto Evaluation Criteria so let us take the appropriate item.

Evaluation Subgroup Report

Elzer

M. Levy was suddenly called to other business. It was not possible to arrange a proper meeting since only two people were there.

We still have staffing problems. Also we must take M. Ichbiah's suggestion about Tinman.

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Elzer

My explanation of difficulty of Eval.Crit. is because the subject is more difficult, and maybe not so attractive. Also other Group Chairmen naturally want the best men on their group.

So we must ask Subgroup Chairmen to be willing to part with personnel.

Bowker

Evaluation criteria subgroup being asked to define criteria after definition is well advanced. This is unreasonable. Also, because group is small there is little incentive to join it.

Skinner

All the more reason why subgroups must produce reports.

Ichbiah

Again I insist, we have no hope of doing anything apart from Tinman.

Robert

Much discussion on Tinman. About 90% is acceptable. Difference of view is surprisingly small.

Elzer

Unfortunately, M.Robert's view is based on a paper which has never been distributed. We should distribute this paper. Are you and M.Malgardis willing to do this?

Malgardis

This has been distributed to attendants of the Purdue International meeting. I can distribute it.

Elzer

I will make proposals for Eval.Crit.Group, by thinking of names of people who could go onto the Eval.Crit. group.

Timmesfeld

We do intend to make our criteria explicit. We have started and we need further discussion probably in June. Will produce draft proposal, by June.

Elzer

What about I/O subgroup and Algorithmic?

Verroust

We have not considered this.

Chalmers

We have a lot of ground to cover and I think our first priority is to complete kernel and look at extensions. We have no time for something else, and I cannot commit the group to completing this.

Ichbiah
Do we ask M. Levy to produce an LTPL Tinman?

Elzer
This would be good but I am not sure there is enough effort available.
The important thing is to get this group going again. I would like to close this discussion.

Report of Tasking Group

Timmesfeld
4 discussions:

1. Modula.
2. LTPL-E/353. CTI Tasking paper.
3. Distributed intelligence.
4. Design criteria.

1) Modula - decided this was too low level for LTPL. Could be basi for implementation.

2) LTPL-E/353. Long discussion. Discussions on:

i) Nesting of PCE's
ii) Access rights
iii) Events
iv) Immediate tasks
v) Statements on P/A's.

i) Nesting of PCE's desirable with very complex problem (100's of PCE's) for better structure. For smaller applications a good subset may disallow this.

ii) Access Rights. Possibility of defining access rights statically. This is job of Algorithmic group. Dynamic access of common data by a P/A with the right to do so is job of tasking group.

iii) Events - not necessary in addition to semaphores.

iv) Immediate tasks. Purpose of these would be to split an interrupt indicating one of a series of happenings into a set of different interrupts. We were not sure where to place this.

v) Needed clarification of these and their effect on PA's.

3) Distributed intelligence. There is a wide spread of systems. One where the operating system of each element only know each other as a peripheral. Communication reduces to I/O. Other extreme is where operating system is evenly spread over all elements in the networks. An in-between is where the operating system is spread but the programmer has to follow restrictions when programming a PCE to be executed on any processor. It was thought by some that these restrictions may disappear in time. We want to discuss these topics with TC8 viz: Operating Systems on Distributed Systems.
Either extreme case is invisible and has no effect on tasking group. In in-between case, tasking group would have to define limitations.

4) Design criteria. Working paper by M. Kronental. First contained design goals.

1. Reliability.
2. Readability.
3. Portability.
4. Efficiency.
5. Conceptual simplicity.

Having decided order of priority of these goals we need more specific functional requests.

Informal talk with M. Lalive. We will have joint session at ISPRA. Prepared by sending papers to group chairmen.

Kronental
I wish to disagree about description of MODULA. It is not best to describe it as low-level, rather its primitives are insufficient.

Elzer
To me, insufficiency is more unfavourable than low-level.

Timmesfeld
I think this is just a verbal disagreement, I think it is agreed that it is not suited to the purpose of LTPL.

One objection is that synchronization is not secure enough. Shared data can be accessed in an unsafe way.

Froggatt
I cannot be categorical about this.

Elzer
I want to see these statements proved.

Kronental
MODULA allows outside programs to read the data of a module.

Timmesfeld

I did not get impression that Wirth thought of MODULA as an application language, rather it is for programming operating systems.

Elzer

I have had this confirmed as regards original design criteria from a co-worker of Wirth. Still this doesn't mean it hasn't further application. I have the impression that monitors are very secure.

Timmesfeld

No I don't say monitors are insecure, but MODULA allows data access not allowed by strict monitors.

Elzer

We must have proof of inadequacy of MODULA.

Bowker

Surely the group have not to analyse all possible languages?

Elzer

Yes but MODULA has many advocates.

Timmesfeld

Not many and they were not at meeting.

Skinner

Main objection was that primitives were at too low a level, allowing too many solutions to same problem.

Kronental

Question is : Is MODULA a good approach to an LTPL Kernel?

Elzer

I would like a decision on whether the Monitor concept is a sufficient one for the LTPL tasking.

A discussion on melt-of-best-features again followed. Ichbiah and Bowker both advocated that since we have qualified and modified the term so much that we should by now reject it. Elzer expressed its importance in guarding against being thought academic.

M. Ichbiah suggested a motion to drop any mention of melt-of-best-features. M. Roberts seconded and it was deferred until next meeting. He then asked Dr. Timmesfeld if a report would be produced detailing shortcomings of MODULA.

Timmesfeld

Our policy with new languages is to discuss, express an opinion and minute it. We do no more and if anyone wishes to advocate a language he must appear and state his case.

Presentation/discussion of Snapshot

Elzer

Shortest way to deal with this is formally. TAC demanded snapshot and subgroup chairmen were asked to prepare reports. These were revised at Meeting in Dec.1976 and final copies came in early Jan.1977. Also I prepared a hasty paper for Sept. TAC meeting and I received criticisms from subgroup chairmen and have revised it according to criticisms. I would like to meet subgroup chairmen after this meeting to discuss with them. Only alternatives are discuss it now which I am sure nobody wants. I will briefly describe structure. There are 5 parts:

1. Overview as in LTPL E/362.
2. Algorithmic subgroup report.
3. Eval.Crit. " "
4. I/O " "
5. Tasking " "

These are exactly as received by chairmen.

Discussion of TAC modifications to Project Plan.

TAC meeting after LTPL Dec. meeting. General reception of Project Plan was favourable but some criticisms.

1. It doesn't cover all aspects of project. This is true and was defended.

2. Not enough reference to Operating System interface in language skeletons. So I have added a short section to take care of this. It is felt that the wording will need modifying. Main point was to avoid divergence between LTPL and current operating systems interfaces.

Chalmers asked if TAC wanted report for next meeting and answer was Yes.

Preparation for ISPRA

Elzer

- We are expected to give a TC3 presentation at ISPRA. Perhaps we can find problems which show inadequacies of other languages. This was thought to be perhaps to aggressive.

The meeting were informed that expenses for ISPRA should be paid by EEC.

Other Technical Matters

Elzer

A paper by Roberts on Re-drafting of Tasking Proposals has no number.

LTPL-E/401 was assigned.

Meeting closed at 1810 hrs.

Minutes of Business Meeting 2nd February 1977

Meeting opened at 9.00 a.m.

Approval of Agenda

Two items added:

1. Status of DOD project - report by Mr. Rommler.
2. Discussion of meeting after next.

Approval of Minutes

Minutes of 35th - corrections to be sent to Dr. Gilbert. Dr. Wegner pointed out that distribution of the PEARL I/O description was not possible now, and some way must be found to expedite this. This fact contradicts a statement in the minutes which must be altered. M. Robert requested para. on page 19 to be deleted since it was not recorded in proper context. Mr. Chalmers suggested removing the Appendix A. It was felt that this information should not be distributed world wide. However, Mr. Elzer pointed out that discussions in the main text were just as problematical. Mr. Elzer suggested that para.21 and the appendix be removed and replaced by a neutral summarising paragraph.

Mr. Timmesfeld moved to keep the minutes as they are. Mr. Chalmers pointed out that Mr. Sokol was asked to keep the matter confidential. M. Robert asked whether the paper could harm the project. After some discussion, it was decided to leave the 35th minutes as they are, but in future, it should be agreed that confidential discussions be unminuted by agreement of the whole meeting.

Various other modifications were suggested, whose detail need not be recorded.

M. Ichbiah suggested a more limited distribution of Minutes but the Chairman pointed out that there were agreements within Purdue International which prevents this.

It was agreed that the closing date for amendments to the 34th and 35th Minutes was 28.2.1977.

Report of Planning Group

Elzer
Status Report

First discussion how to continue with Snapshot report. The paper, (for description, see minutes of technical plenary) will be distributed to all on A-list and C-list.

Discussion on TAC
(See Technical Meeting Minutes)
A proposal was made to change the name of the project.

Malagardis
The name is not an important issue. A paper was produced by the commission stating that "LTPL-E should be the main source of information". This was objected to (mainly by UK delegates) who also suggested the name ERTL.

Status of Project within EEC

Elzer
Dr. Diettrich informs us of another small delay in the COREPER who wish to extend the competence of the Comité Representative to cover the project. It is hoped to get go-ahead by 1st March 1977. The project leader job has been advertised and is now closed to applicants.

Co-operation with other groups

This really concerned TC8. Difficult to establish the exact feelings between the groups. An informal meeting was held with Dr. Timmesfeld (see report of Tasking group in Tech. Plenary minutes).

Detailed Bye-laws

Several sets exist:

1. International Purdue Bye-laws - rather large.

2. Smaller set of LTPL-C bye-laws, mainly to enable letter ballot.

3. When EEC contacts started (2 years ago) more detailed bye-laws suggested to cover the working relationship between LTPL-E and EEC. M. Malagardis produced a set, revised by Chalmers and Elzer and then the work was suspended until the relationship settles down. Although it is progressing, it is not felt yet that the time is right for new detailed bye-laws. So it is suspended again.

TAC Reports

Mr. Chalmers suggestion for written reports on TAC meeting was accepted in principle, but situation on what may be distributed is not clear.

Minutes

Discussion on minuting possibly confidential discussion took place without any conclusion.

For information, all EEC decisions are reported in the Official Periodicals of the Member States.

Robert

With respect to the minutes, the problem is caused because the usage of the minutes has changed. Previously they were only read by active members and so a relaxed attitude could be taken, for example in including humorous sections. Now the readership has changed we need to be more careful about the minutes. Perhaps we need some internal minutes plus a summary of these for external use. The draft minutes would be a temporary life.

Chalmers

Formal minutes are difficult since our meeting is informal.

M. Robert agreed to try to produce a digest of the 36th meeting minutes.

Mr. Bowker suggested taking up Mr. Elzer's idea to separate technical and business minutes and to exclude non LTPL-E members from the Business meeting.

Mr. Rummler felt that this would make co-operation difficult.

M. Robert thought that his idea was better as long as DOD were careful not to distribute the detailed minutes. Some division of the A-list would be needed.

M. Robert formulated this agreement to produce both the usual minutes and an official precis into a motion which was unopposed.

Distribution was discussed, for condensed minutes. First draft only to people present. After approval they could be given wide distribution.

Report on DOD progress

Rummler

This is an informal status report. A statement from Col. Whitaker underlines the importance of co-operation. In particular, he wanted clarification of why LTPL consider a Process Language as a different problem from Tinman. He can still see no real difference between requirements for military and industrial control applications.

We have now completed an evaluation of 23 languages:

FORTRAN, COBOL, PL/1, HAL/S,
TACPOL, CMS-2, CS-4, SPL/1,
J-3B, J-73, Algol 60, Algol-68,
CORAL-66, PASCAL, SIMULA-67,
LIS, LTR, RTL/2, EUCLID,
PDL/2, PEARL, MORAL, EUL-1.

20 contractors evaluating these languages against Tinman requirements. Evaluations received in Oct/Nov 1976 and had about 1000 comments on Tinman. Decision made for interim list of languages to narrow scope for projects starting now:

FORTRAN COBOL TACPOL CMS2 J3 J73 SPL-1

This is to prevent proliferation of languages being used.

Evaluations correlated in December 1976.

Basic results:

1. No language met enough requirements for selection now.

2. A single language could be constructed.

3. This language most likely would be a modification of an existing language.

4. The proposed basis for further development is the language families PL1, Algol-68, PASCAL.

IRONMAN produced in Feb.1977, taking all comments into account. This is approved.

On 1st Jan.1977, economic analysis started to discuss wider issues - economic, managerial - and to assess impact of adoption of new language from these angles.

Recommendation that 6 contractors produce:

1. Informal language design - with syntax.
2. Semantic definition - similar to axiomatic PASCAL.
3. Draft user manual.
4. Prototype compiler/interpreter.

This effort goes from 1st May to 1st September.

After this a 1-month evaluation to narrow down to 3 contractors to develop more complete implementation. Also Steelman will be then produced. After November things are indefinite. Ironman will be distributed to all LTPL-E members as will Cornell workshop minutes.

M. Robert expressed "warm approval" of the DOD co-operation.

Elzer

Is it possible to feed back response to criticisms of Tinman?

Rummler

Not really possible to respond to all the many comments. The Iron Man will contain the effective response.

Mr. Barnes read out a summary of the changes incorporated in Iron Man. It was only a draft and is not minuted, the official document will appear shortly.

Elzer

I am interested in this basis for future development of the families of Algol-68, PL1, PASCAL. Why was this decision made?

Rummler

Evidently felt that these families cam nearest to meet the requirements, so that these were the best frameworks for future works.

Elzer

Can compilers really be by September?

Rummler

Very likely may only be a skeletal compiler - unlikely to be complete.

Elzer

Can a document be distributed about DOD?

Rummler

There is a Project Plan but I do not know yet what the distribution will be.

Discussion of General Situation

Elzer

Are there any further comments/suggestions?

Skinner

With respect to the controversial statement objected to by TAC, what is the status? What is TAC's status?

Malagardis

The new wording is more or less accepted. TAC has no official status whilst project has no official status. Still TAC does exist.

Timmesfeld

My impression is that TAC's formed to get advice on special projects. Since LTPL does not yet exist, TAC cannot be fully official.

Discussion turned to differences between DOD and LTPL. Mr. Timmesfeld felt that the difference was reducing with greater emphasis in Iron Man on Parallel Processing and Input Output.

Robert

If Iron Man is more specific in areas where LTPL decisions are still pending this would affect our work. This could be much quicker if at least copies could be sent to Chairmen.

Rummler

Draft copies have been sent to key LTPL members, but I have not got the list. Unfortunately, delays in posting are again presenting a problem.

Elzer

Our relationship to other TC's is still worth discussing. A more technical general position paper for TC3 would be desirable. Obviously, this would overlap with other work but still would be a good idea. Main danger is that the author could apply a one-sided view. So it would have to be approved by all chairmen.

Malagardis

Nothing shows that individual studies could be integrated into a full scale report which is what was needed. So I suggest to Layton to release funds to produce such a report.

Jones

What we want is surely something very similar to Tinman.

Bowker

I doubt if anyone objects in principle, but can we settle the details now.

Malagardis

Snapshot reports are only intended for non-technical people. More depth needed for someone to find out briefly the technical work of the committee.

Elzer

I think the idea is accepted. I cannot see how we can finalise details before ISPRA. Could M. Malagardis write down his ideas and distribute them to planning group and also ask Layton about possibility of money?

Chalmers

I accept the proposal in principle, but can we really sensibly hope for funds? Past experience is not encouraging.

Elzer

Language Comparison was funded and others were voluntarily deferred by us, due to greater priority of items in August 76 work module proposal to EEC. I feel that the chances are quite good; at least worth trying.

Software Management Conference

Elzer

This is in London 21st-22nd March 1977. Participant-fee is high £135 + VAT which may cut out some members.

Other conferences:

ISPRA provisional information sent. Details inclu'ing transport details will be sent in good time.

Two other meetings in U.S. were notified by the Chairman.

Mailing list and paperlist:

Mailing list was check O.K.

A - gets everything
C - invitations + important papers
O - invitations only.

Paper list. Not everybody received updated paper list.

A.O.B.

Bowker

Could I raise the possibility of 2-day meetings?
It was agreed to vote on this at ISPRA.

Next Meeting	-	ISPRA March 30th	-	April 1st
Following	-	Brussels June 1st	-	June 3rd
Following	-	Brussels Sept.5th	-	Sept.7th

Meeting closed at 1200 hours.

LTPL - E / JR 771025

Replaces JR770727

Author

J.W. Roberts

Category M

Title

Minutes of the 38th LTPL-E-Meeting, Brussels
June 1 to June 3, 1977.

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Those present:

J.G.P. BARNES	ICI Ltd
A.F. CHALMERS	GEC Computers Ltd
G. COHEN	CERCI
O. DIETTRICH	EEC
P. DESCHIZEAUX	Uni Grenoble
P. ELZER (Chairman)	Uni Erlangen
T.J. FROGGAT	Uni York
T. GOLBORN	System Designers Ltd
M.E. HELFERT	GADV
A. KAPPATSCH	IDAS GmbH
F. KRELLA	EUROCONTROL
M. KRONENTAL	IRIA/CTI
R.F. MADDOCK	IBM UK
R.M. DE MORGAN	DATASKIL Ltd
W.E. QUILLIN	PLESSEY
J.W. ROBERTS	MBP GmbH
D.C. RUMMLER	Office of Naval Research (US)
S. SAVOYSKY	LCPC
I. SMITH	DIGITAL EQUIPMENT
J. TELLER	SIEMENS AG
K. THOMPSON	NCC
K.-H. TIMMESFELD	IDAS GmbH
G. VERROUST	IPN/Uni Paris Sub.
P. WEGMANN	ETH Zürich

Apologies for absence received from:

G. BIANCHI	DPHN/HE
Bundesanstalt für Flugsicherung	
R. GILBERT	AERE
H.F. HARTE	Software Sciences Ltd
J.D. ICHBIAH	CII
M. INDERST	ESG
J. LEVY	SESA
N. MALAGARDIS	IRIA/STI
I.C. PYLE	Uni York
D.N. SHORTER	BSC
I.C. WAND	Uni York
E. WEGNER	GMD
H.B. WILLIAMS	MBP GmbH

Technical Session 2.6.1977, 14.00

T1 Approval of Agenda

The agenda was approved.
Mr Elzer distributed copies of transparencies he had used in a presentation at Eurocontrol.
Two new members were present:

1. F. Krella, Eurocontrol. Mr. Krella was attracted to LTPL/E by Mr. Elzer's presentation. He is responsible for systems and support in Eurocontrol. Eurocontrol has been interested for ten years in languages for real-time systems and has done some research in this area.

2. I. Smith, DEC. Mr. Smith is replacing Mr. Skinner. He works on real-time systems and languages.

T2 Algorithmic Subgroup Report by Mr. Chalmers

The subgroup was attended by only 5 people. Five of our regular members were unable to come but we welcomed the transfer of Mr. J. Barnes to our subgroup.

We started as usual with approval of the minutes of our last meeting and review of actions arising.
The changes and additions to our Algorithmic State of the Art report made during the March/April meeting were reviewed. As a result we will be able to distribute this report, giving the Algorithmic State of the Art up to April 1977, to the A-list within the next few weeks as a replacement for paper 320.

We then processed position papers on our last two 'deferred topics' namely

Static Shared Storage
Array Dimensions.

Most points of the former were agreed and fundamentals were established for the latter. The results will be reviewed in our draft State of the Art report in October.

The first half of the second session was taken up by a discussion of the project status and new proposals reported at and formulated within the Planning Group meeting. This provided feedback for the Planning Group and gave the opportunity for views to be expressed at the business part of the Plenary.

The remainder of the session was taken up by a joint meeting with the Tasking Subgroup. The objective was to try to identify any 'grey areas' between the scopes of the two subgroups and to decide which group should handle such points. The paper Nr. 366 "Synchronisation and Structuration Tools for Algorithmic Problems" by Mr. Deschizeaux was taken as a starting point.

Mr. Timmesfeld stated in the current *Tasking Proposals* task creation, activition, waits etc. are explicit . hence the user must decide how and where to invoke them and not expect a very high level compiler to do this for him. The Tasking Subgroup have considered some implicit tests but decided that they were too costly at least with present techniques.

Mr. Chalmers proposed that the example on page 4 of paper 366 should be taken as a sample problem for the Tasking Subgroup, giving solutions for both the monoprocessor and three processor cases. He asked if this could be done by the next meeting. Mr. Timmesfeld accepted the proposal and Mr. Roberts said he would attempt to do the work.

A discussion on 'what is Algorithmic and what is Tasking?' led to the following conclusion:

> 'Algorithmic and Tasking statements are mixed in a program. The Tasking statements act as "punctuation" and control, with the Algorithmic statements serving as "phrases" in between expressing the sequential processing within an activity'.

With regard to representation of the Tasking functions, it was agreed that the Algorithmic Subgroup should define the syntax from semantics provided by the Tasking Subgroup. However the Algorithmic Subgroup feel that they can only do this meaningfully when the revision of the Tasking Proposals of paper 243 has been done.

With regard to Time, the Tasking Subgroup see the need for absolute time and elapsed time. The Algorithmic Subgroup should propose the Data Type in which to express time.

Discussion

None

T3 Report of Evaluation Criteria Subgroup by Mr. De Morgan

Three members (but the same three as last time!).

1. Continued review of IRONMAN commenced at ISPRA meeting. Each point was examined and evaluated. R.M. De Morgan to produce paper to be edited by Eval. Crit. s/G for distribution to Comm. before Sept. meeting.

2. Mr. Cohen reported on Planning Group meeting of 1 June.

3. Papers have been received (not yet discussed):

   Kronental: "Some Design Criteria for Tasking in LTPL".

   Chalmers: "Comparison of Overall Functional Requirements of DoD-HOL and LTPL (European)".

   Reh: "Functional Requirements for PLIP".

Pyle: "Suggested Technical Design Criteria for LTPL" (8 Oct. 76)
"Revised Technical Design Criteria for LTPL".

4. Draft list of design criteria was not prepared because of lack of time. Mr. Levy and Mr. Cohen to prepare paper for discussion.

Discussion

Mr. Elzer has recieved a paper from Nigel Jones purporting to be a reply to Mr. Whitaker's publicity handout on the DoD project, in which Mr. Jones expresses skepticism of the value of informal language definition and of the possibility of compiler verification without formal definition. Others have not received this paper. Mr. Elzer will ask Mr. Jones if the paper should be distributed.

Mr. Elzer: What are the results of your discussion of IRONMAN?

Mr. De Morgan: I prefer not to summarise but refer you to our paper.

Mr. Barnes: What is your general feeling? Good, poor ...?

Mr. De Morgan: It is on the whole consistent; with exceptions. Some features are technologically advanced compared to the rest of the language, e.g. rigid control of side effects against freedom in structures and use of the heap.

Mr. Elzer: Thank you. I am pleased to see this subgroup moving forward.

Mr. Chalmers: Col. Whitaker said at ISPRA that he saw no difference between industrial requirements and DoD requirements. There was a request for papers from those disagreeing. I have prepared a paper on this and given it to the Evaluation Criteria Subgroup.

Mr. De Morgan: It looks like a useful and concise statement but we have not yet discussed it.

T4 Report of I/O Subgroup by Mr. Verroust

We met with only 2 members after reception of 4 letters of apology.
However we worked fruitfully in the frame of our agenda.

1. We built the general structure of an evolutionary I/O technical status report containing permanently the state of our work, element by element.

2. After, we had an important discussion to define the basic elementary objects proposable for I/O features of LTPL.

   And we proposed a generalized FILE concept defined as a special class of "task" or parallel activity having the properties of a generalized I/O physical device.
   We began too a discussion on I/O elementary primitives.

3. We discussed on Planning Group Meeting.
   Our analysis of I/O part of IRONMAN was done at ISPRA's meeting and spread to A-list under number 380. We didn't have any answer or comment.

4. We'll have to plan a joint meeting with tasking group to compare our synchronization needs with their mechanism in order to merge the similar functional objects.

5. And, before September we'll have some contacts between subgroup members to prepare the first copy of our state of the art dynamic report.

Discussion

Mr. Kappatsch: Considered as a task a file has peculiar properties. Activation is by an I/O statement and when it terminates it issues a connected happening. Another property is that it keeps a memory of previous activations. The OPEN and CLOSE of I/O can be seen as bracketing a set of activations with synchronisation properties to forbit use of the file except between the brackets. A second point. A file can execute code, we would like to pass code to a device.
We hope to make these proposals more concrete.

Mr. Elzer: An example problem; PDP11 with CAMAC - to read some particular register. In assembler, the solution is a single instruction. How could this sort of problem be solved without overhead.

Mr. Kappatsch: This is an example of passing code to a file.

Mr. Timmesfeld: The question is unfair. You demand a mapping onto a particular machine-code without overhead.

Mr. Froggat: At language level, communication with a task and with a file may be similar. The compiler can in special cases replace a communication statement with little inline code.

Mr. Timmesfeld: There is a problem of synchronisation with the end of an I/O operation.

Mr. Kappatsch: We have considered this, as mentioned earlier.

Mr. Elzer: A powerful general mechanism is good for complex cases but not good for simple cases such as my case of one assembler instruction.

Mr. Timmesfeld: It cannot be just one instruction, you also have reaction to an interrupt.

Mr. Elzer: Not in this case.

Mr. Verroust: One could for example request return of status values at the end of I/O.

Mr. Krella: What does that mean in high level language terms?

Mr. Kappatsch: Perhaps this problem could be solved by 'special controls'.

Mr. Elzer: Then it wouldn't be machine-independant. On another computer than PDP11 a complicated reading sequence might be involved.

Mr. Verroust: Our concept can be used at many levels. There will be a paper available before the September meeting.

T5 Report of Tasking Subgroup by Mr. Timmesfeld

The meeting opened with four members, rising to six. We have been having problems with the minutes. Mr. Smith is replacing Mr. Skinner as secretary and he will try to retrieve those minutes which Mr. Skinner has failed to deliver.

Two technical points come up during our meeting with TC8 at ISPRA. We completed our discussion on these with the decisions:

1. to drop dynamic priorities
2. to drop enabling and disabling of interrupts.

We continued the discussion on distributed processing and its influence on tasking. Mr. Timmesfeld will provide a position paper by the next meeting, summarising our ideas so far, namely that the programmer must provide information on where tasks are to run and that there must be restrictions on the information exchange between tasks running on different parts of the distributed system.

A discussion on time was originated by an interrupt from Mr. Barnes. We decided (again) that we recognize two kinds of time, elapsed time and point of time, i.e. time of day, perhaps with date. A discussion of possible representations followed; this is really an algorithmic feature and was handed over to the algorithmic subgroup in our joint meeting.

This morning we discussed the results of the Planning Group meeting. The planning group had proposed that the rate of working of subgroups could be increased by week-long meetings of the contributing members. In our case, a paper should be produced summarising our work to date, filling some of the gaps and including arguments for and against. This paper would then come to the full commitee.

About 3 such working weeks, possibly including some contact with other subgroups, could provide a language definition suitable for pilot implementation.

The tasking subgroup would like the opinion of other subgroups.

We concluded with a joint meeting with the algorithmic group, already reported on by Mr. Chalmers.

Discussion

Mr. Elzer: The write-up of tasking proposals has been pending for a long time. The proposal of longer working meetings is interesting and should be pursued.

Mr. Timmesfeld: We see such a meeting as replacing a normal one, not additional to it.

Mr. Elzer: It could be attached to a normal meeting.

Mr. Timmesfeld: Only with loss of time. Less than a full week becomes inefficient, since we need some start-up time, perhaps a day, for members to refamiliarise themselves with the work.

Mr. Elzer: We used to have six meetings a year and now have only 3 1/2, which many people feel is not enough. The tasking group proposes a further reduction.

Mr. Timmesfeld: Most members are most interested in subgroup work. I think plenaries take up too much time, and so does Mr. Chalmers.

Mr. Barnes: So do I.

Mr. Chalmers: I did suggest spending a higher proportion of our time on subgroup work. It is certainly worthwhile for the tasking group to have a longer meeting for this special purpose; it is not so clear for other groups. I do not want to drop the plenary altogether.

Mr. Elzer: This 'caucus' meeting was my suggestion, but I expected an additional meeting of perhaps 3 - 4 tasking group members.

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ANNUAL MEETING OF INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL C--ETC(U)
1977 N00014-78-C-0127

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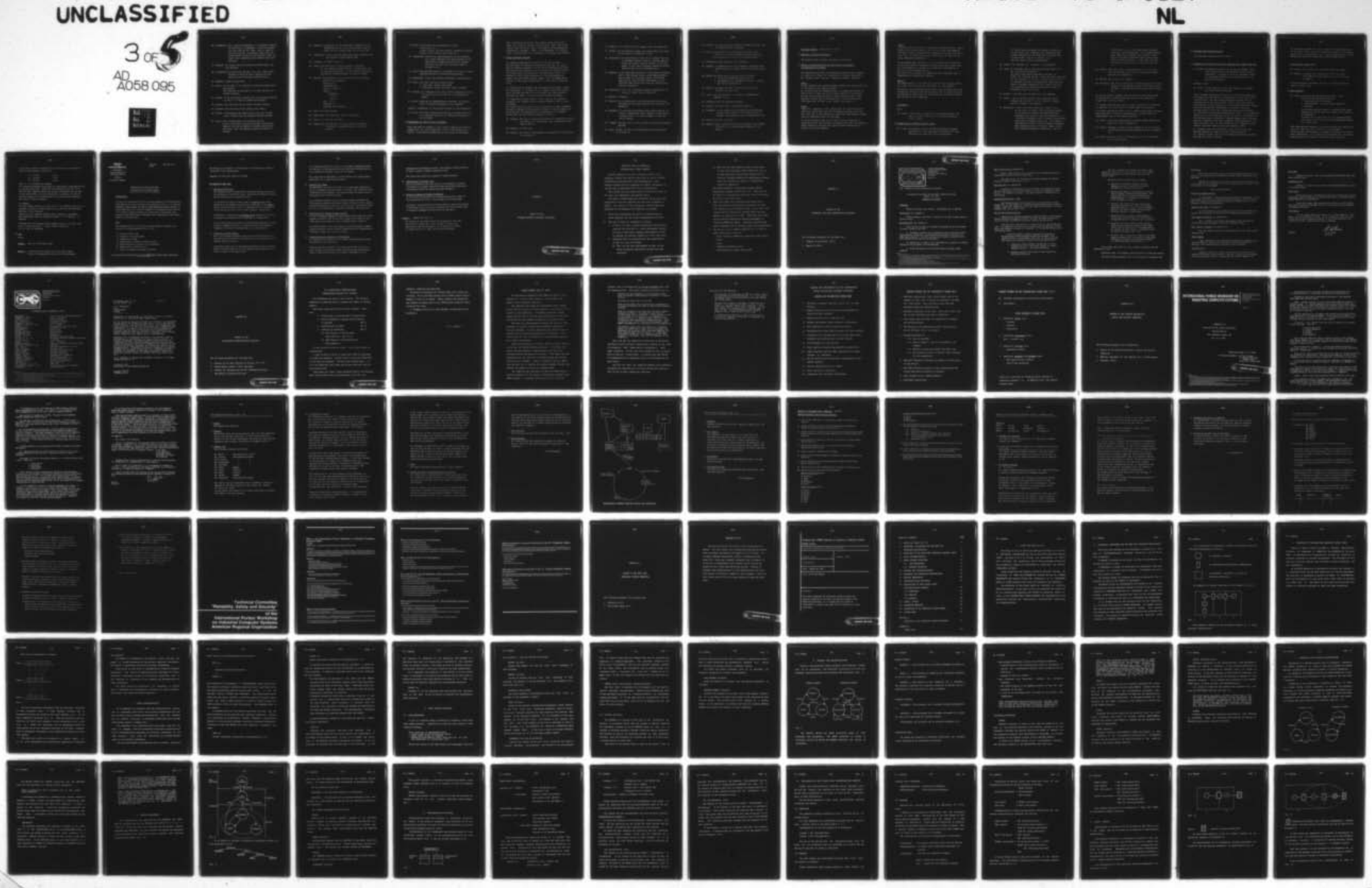

Mr. Timmesfeld: Yes, selected membership. As a concrete example, we could meet in September - this is probably the only time for Mr. Wand. This is close to the full meeting, so probably noone from the caucus would attend the full meeting. Also, we think other subgroups could benefit from such meetings.

Mr. Maddock: You could hold your meeting directly before the full meeting.

Mr. Timmesfeld: We would lose one day, i.e. 20%; really more, because of start-up time. Perhaps the full meeting could be Friday afternoon only?

Mr. Maddock: Friday morning only.

Mr. Elzer: Is the idea at all realistic? Funds? Who meets whom when where?
The reduction of meetings to 4 a year was not universally popular.

Mr. Barnes: If we use Friday afternoon for the business meeting, we have 1 1/2 days for subgroup meetings.

Mr. Roberts: Not everyone can get home on Friday evening.

Mr. Helfert: This has been tried; people leave early.

Mr. Barnes: If necessary some people could stay over Friday night. Anyway only the business meeting suffers.

Mr. Elzer: Don't underestimate the business meeting.
I also find Friday afternoon meetings inconvenient.
There is an item on tomorrow's agenda for meeting structure, also the planning group can discuss it tonight.

Mr. Chalmers: Discussion in the algorithmic subgroup is too exhausting for us to use a full week; also we might not have enough items to fill the time.

Mr. Timmesfeld: I have contrary experience. Many companies use this method in development work.

Mr. Chalmers: It doesn't suit me.

Mr. Elzer: Are there any technical points? I have one. We have sample problems from Mr. Deschizeaux, one is counting interrupts, or very minimal processing. Traditional tasking imposes too much overhead.

Mr. Roberts: The overhead is not very high with the second solution on the board.
(Refering to:

```
INTERRUPT INT;
SEMA S; INTEGER I;
TASK T:
    L: REQUEST S;
       I:= I+1;
       GOTO L
END /* T */;
ACTIVATE T;
WHENEVER INT RELEASE S; ...)
```

Mr. Elzer: 600 microseconds!

Mr. Timmesfeld: How often does such a case arise?

Mr. Elzer: It is 30% of the load.

Mr. Timmesfeld: The solution is in any case not complete. 'I' should be increased only in a critical section.

Mr. Elzer: In my case the processing is in fact
A(I):= A(I) +1.
I don't need a critical section, because it doesn't matter if the results are a bit off.

Mr. Timmesfeld: Leaving out synchronisation is not suitable for a safe language. The synchronisation overhead could be reduced by moving it outside the loop, but then the loop would have to include a test.

Mr. Elzer: This problem should be included in the set of sample problems and must be solved satisfactorily.

Mr. Timmesfeld: Either one accepts overheads or loses safety.

Mr. Elzer: One could introduce access rights
1. read only, change disallowed
2. read only, change (by other tasks) allowed.

Mr. Froggat: An interrupt could occur between changing 2 words of a multi-word item such as a floating point number.

Mr. Elzer: There may be implementation problems. We need explicit interrupt-handshake in the language.

General: disapproval of the detailed nature of the discussion.

Mr. Elzer: For simple things there should be simple solutions. I am convinced there is an acceptable solution to this problem.

T6 Replacement of 'melt of best features'

There had been no response to Mr. Elzer's request for written suggestions. Mr. Elzer suggested 'melt of best proven principles'. Alternative suggestions in the course of discussion

were 'conceptual evolution' and 'proven state of the art'. There was a general feeling that the words 'melt' and 'principles' were not quite right. 'Principles' could perhaps be replaced by 'concepts', 'melt' by 'integration' or 'fusion'. 'Best' was suggested to be redundant. No decision was reached.

T7 <u>Other technical matters</u>

Mr. Rummler reported on the state of the DoD project: The DoD wants to finalise contracts by July 1st. Mr. Elzer and the subgroup chairmen are invited to Washington to brief DoD and the DoD contractors on the status of the LTPL-E work. They think July 13th would be a suitable date. LTPL-E is invited to join in the evaluation of the deliverables of phase 1 and of further phases. Phase 1 will be completed at the end of this year. Evaluation will take place in January 1978.

Mr. Barnes and Mr. Maddock had information that phase 1 would run from Sept. 77 to march 78. Mr. Rummler could not confirm this. The RFP had been out on 23rd April and the intention had been for phase 1 to run from July through December.

Mr. Timmesfeld thought phases 2 and 3 were on too narrow a timescale. Mr. Rummler said he expected phases 2 and 3 to be stretched.
Mr. Elzer said that LTPL-E would not be able to meet a deadline of end of January for evaluation of phase 1. He also asked who would pay for the proposed trip to Washington. Mr. Rummler stated that DoD had nothing budgeted for this.

Mr. Froggat: The DoD is essentially asking for evaluation criteria from LTPL-E. Is it expected that contractors would consult LTPL-E?

Mr. Rummler: If they like.

Mr. Froggat: Will LTPL-E requirements and proposals be circulated to contractors.

Mr. Rummler: No, contractors will supply their own expertise.

Mr. Barnes: The differences between our requirements and those of DoD should be presented to DoD.

Mr. Timmesfeld: One difference is that in for example the use of embedded weapons systems a special purpose operating system could be written in the language. In our case a standard operating system would be part of the implementation.

Mr. Rummler: In my experience software is produced and modified over a considerable period. Some common modules may be used. In a process control environment there may be some software developed for e.g. chemical plant which could then be used by other chemical companies.

Mr. Timmesfeld: We do try to produce reusable packages but up to now it hasn't worked very well.

Mr. Barnes: I disagree.

Mr. Rummler: In my experience we started out building unique programs for each ship, aircraft etc; this got too expensive.

Mr. Chalmers: If a central procurement body exists control is easier. Independent bodies demand so many special features that it is often cheaper to redo the whole package.

Mr. Froggat: The LTPL will not be suitable for writing operating systems.

Mr. Elzer: Rather, we are not constrained by the requirement to be able to.

Mr. Froggat: We are eliminating features needed for this, such as enable/disable interrupt.

Mr. Elzer: Do we accept this invitation for July 13th? I think so. We must discuss whether we can meet that deadline and what we can present there.

Mr. Timmesfeld: What was meant by 'briefing'?

Mr. Rummler: A presentation by each chairman including something shown on a screen which we can take copies of.

Mr. Barnes: We could try to say two sorts of things

1. the LTPL requirement are so and so
2. we disagree with IRONMAN in points x, y and z, and offer alternatives.

Mr. Maddock: The paper by Pyle, Ichbiah and me will be avaiable by July 13th.

Mr. Elzer: Will all who want to comment on IRONMAN send comments to me.

Mr. Chalmers: Also to subgroup chairmen.

Mr. Quillin: You will need a preparatory meeting.

Mr. Chalmers: I will propose at the planning group meeting tonight that we meet 3 or 4 weeks before to prepare a presentation with transparencies etc.

Mr. Barnes: Who will be there?

Mr. Rummler: Half a dozen contractors, probably 2 or 3 people from each, also an equivalent number of DoD people.

Business Session, June 3rd 1977, 9.15

B1 Approval of previous minutes

The minutes were accepted with minor corrections.

B2 Report of planning group and discussion of possible reorganisation of LTPL-E

The planning group held two meetings attended by Mr. Chalmers, Mr. Cohen, Mr. Elzer, Mr. Kronental, Mr. Layton (part only), Mr. Thompson (part only),Mr. Timmesfeld and Mr. Verroust.

Item 1

It was reported that another member country will bring criticism of the project and propose changes.
Mr. Layton asked the Planning Group to propose priorities for LTPL-E work in case not all the money asked for in the last project plan becomes available. After discussion Mr. Elzer prepared a paper which was discussed in the second meeting. This paper will be sent to Mr. Layton (see Annex 1).

Item 2

There was a suggestion that cooperation with the DoD project should be formalised. Some LTPL-E members already work with DoD. This led to difficulties at ISPRA when some members needed time for discussion with Mr. Whitaker.

Mr. Elzer proposed that part of LTPL-E work be devoted to cooperation with DoD and part to ongoing LTPL work. The planning group reached no decision and would welcome expressions of opinion from other members.

Item 3

It was decided to accept the invitation expressed by Mr. Rummler during the technical meeting (T7) for Mr. Elzer and subgroup chairmen to give a presentation in Washington during the week of July 11th. This date was however felt to be too close, so the group requests postponement.

It was agreed that the main aim of the presentation should be to give our views on evaluation criteria and work in this area will be speeded up to enable us to give more information on July 13th (or preferably later).
NB. There are no longer any complaints about American lack of cooperation in information exchange.

Item 4

The ISPRA motion. It was felt that this concerns mainly LTPL-C. Mr. Elzer will write to Mr. Reh about it. (See Annex 2)

Discussion in the planning group led to the conclusion that the wording of the motion was too rigid and that it lays too strong obligations on the group. We should find out what IFIP customs are (we are an IFIP subgroup).

Discussion

None.

Mr. Elzer: I take this as approval of the prepared paper and hand it to Mr. Diettrich for typing and sending to Mr. Layton.

B3 Contacts with ISO/TC97/SC5/WG1-'PLIP'

Mr. Elzer: The British, French and German national standard organisations have produced contributions for the ISO group on industrial control languages.

Mr. Elzer has distributed the German contribution to the A-list, Mr. Kronental will distribute the French contribution. We would like the paper submitted by BSI, authors J. Barnes et al. Does Mr. Barnes permit distribution?

Mr. Barnes: The chairman, Mr. Thompson, is responsible.

Mr. Elzer: If the paper may be distributed please send it to Mr. Levy for distribution.
We should also discuss possible contacts to CCITT. Mr. Whitaker and Mr. Leyton are also interested in such contact. My attempts to date find little or no interest by CCITT in cooperation. They have produced a language comparison which some of us have. The planning group would be grateful for help in arranging a talk with CCITT.

Mr. Barnes: I can give you the address of the chairman.

Mr. Elzer: I have a letter from Mr. Pyle proposing better cooperation with IFIP 2.4, of which Mr. Ichbiah and Mr. Kronental are members.

Mr. Kronental: I was at the first meeting of IFIP 2.4 at ? in the south of France. Many well-known people in the field of machine-oriented-high-level-languages were present. The main interest is in a two-level language, level 1 being a conventional algorithmic language while level 2 can express implementation details such as memory management, data representation, interfaces, semas, tasks. They discussed separate compilation, safe use

of pointers (e.g. in the algorithmic language there are typed references, in the implementation part these may be mapped onto integers; there have to be rules to prevent users doing tricks with low level pointers.) I have just recieved the latest book from WG 2.4 edited at IRIA by ? ?

Mr. Teller: They also work on instrumentation, e.g. of code size and running times and are producing standard programs for comparison.

Mr. Barnes: Can we get their papers?

Mr. Kronental: The book is too thick to distribute to the A-list. There is no microfiche version. The book is sold by IRIA, I can get details of price, how to order etc.

Mr. Teller and Mr. Maddock reported that the last meeting was in Novosibirsk 2 weeks before and that one was planned for August 8th - 12th in Toronto.

Mr. Barnes reported that anyone would be permitted to attend as an observer, but could become a member only by invitation.

Mr. Barnes considered however that a formal relationship between LTPL-E and WG 2.4 would be inappropriate, as they work with experimental and we with proven features.

Mr. Elzer: I have been approached by several people asking why there is no such cooperation.

Mr. Teller: Perhaps we should invite members of WG 2.4 to give presentations on advanced features we are interested in.

Mr. Elzer: The main thing for the moment is to find out where to get their papers.

B4 Contacts with DoD-HOL project

This had been covered under T7 and B2.

B5 Discussion of meeting structure, mailing list, paper list etc.

Mr. Elzer: The speed with which we are getting through today's items confirms that the business session can be compressed. I propose we hold the business session on the Friday afternoon of the next meeting as discussed yesterday.

General: Agree.

Mr. Elzer: I urge subgroups other than tasking to consider full-week working meetings.

There followed discussion on the best site for such meetings. One possibility was the EEC establishment at Geel about 60 km from Brussels. This would keep participants away from the distractions of the big city and useful facilities such as photocopying would be available. On the other hand small groups could be conveniently accomodated in the EEC offices in Joyeuse Entrée, where also copying facilities are available. Mr. Diettrich could arrange accomodation there. It was therefore agreed to hold a working meeting of the most active members of the tasking group in Brussels. Proposed members were Kronental, Roberts, Timmesfeld and Wand. September would probably be the most convenient time. It was agreed that Mr. Timmesfeld would contact the above named members and arrange a date.

Mr. Chalmers said the algorithmic group would at the next meeting discuss the need for such a working meeting.
Mr. Verroust thought that the I/O subgroup would have staffing problems for such a meeting.

Mr. Kronental stated that since a paper describing the state of the total LTPL-E effort is required, a paper by the tasking group alone is insufficient. Mr. Chalmers replied that a paper showing the status of algorithmic work already exists.

Mailing List, Paper List

Mr. Elzer: Don't forget the new paper numbering scheme.

Mr. Barnes: I propose the readoption of the old scheme. One cannot now know whether one has a full set of papers.

There was general agreement that the new scheme should be given a longer trial.

B6 Next meetings

Mr. Elzer: We have a meeting planned for Sept. 12-14. There are two diverging proposals

1. more meeting for more work
2. less meetings, more and longer subgroup meetings.

The tasking subgroup meets in September and those members who attend would not attend a full meeting in September.
Moreover we can have only one more funded meeting this year. Do we want to shift the September meeting to a later date?

There was general agreement that only one more full meeting be held this year and that it be later than September.
The exact date would depend on holidays in France, Mr. Elzer's other commitments, the ISO meeting in November etc. Dates were narrowed down to 3 possibles which were then voted on.

A vote for indicates acceptability of the date, more than one for-vote per person is possible:

17 - 19 Oct	11 for
24 - 26 Oct	8 for
26 - 28 Oct	5 for.

Thus 17 - 19 October was adopted.

Mr. Chalmers proposed continuing the algorithmic subgroup meeting on the 20th and 21st. Could the full meeting be on the 17th - 18th so that subgroup could use as much as desired of the rest of the week? After a little discussion a proposal to hold the plenary meeting at the beginning of the meeting was rejected with only 3 votes in favour.

In summary:

The next normal meeting is from 17th - 19th October with the full technical session in the morning of the 19th and the business meeting in the afternoon.

There will be a special tasking group meeting in September.

The algorithmic and I/O groups will meet 17 - 18 and 20 - 21 October.

Proposals for the meeting after October were 25 - 27 Jan. 1978 with 11 votes for and 1 - 3 Feb. with 6 votes for.

25 - 27 Jan. is accepted.

B7 AOB

None.

Annex 1 List of First work items

Annex 2 Letter from Mr. Elzer to Mr. Reh about Ispra motion on cooperation with DoD (to be provided)

COMMISSION
OF THE
EUROPEAN COMMUNITIES

Directorate-General

Internal Market and
Industrial Affairs

III-B-2

LTPL-E/PE 77060201

Brussels, 8th June 1977
OD/lv

Proposed list of first work items

in preparation of an LTPL-E project

JUSTIFICATION

In view of the continuous delays of the formal adoption of the LTPL-E project something has to be done to maintain the continuity of work. It is therefore proposed to take up again the idea of "small funded pre-project studies". Of course these have to fit into the framework of a subsequent project plan and it is therefore further proposed that certain parts of the project plan proposal by the LTPL-E Group in September 1976 be undertaken as such studies (maybe in a modified form).

LIST

The following short list of items of work was therefore discussed at the meeting of the planning group on June 1, 1977 :

1) Writeup of LTPL-E work
2) Collection of sample problems
3) Evaluation of Ironman
4) Identification of advanced language features
5) Identification and evaluation of I/O mechanisms
6) Identification of Software tools
7) Studies on language-to-language translation.

The ordering is according to a "rating" given to the proposals by a kind of "straw vote" of the planning group.

Proposals for other such studies are welcome.

EXPLANATION OF WORK ITEMS

1) Writeup of LTPL-E work

The "snapshot report" has only given a very brief overview on activities and achievements of the LTPL-E group. Especially the technical contents has not been described in sufficient detail.

It is therefore necessary to have a paper of technical nature which describes the achievements, decisions and problem areas of the complete LTPL at the current point in time. It shall neither be a re-invention of work already done nor a kind of "mini"-language - specification.

Nevertheless it shall have an integrating effect insofar as it describes the status of the discussion of all subgroups in a synoptic way.

For the reasons given and in order to achieve maximum continuity and efficiency we recommend this work to be done by the most active members of subgroups in the form of caucus-meetings of e.g. one week each.

2) Collection of sample problems

Most of the language developments until now have suffered from the fact that definition was frozen before adequate tests of the useability of the language could be undertaken.

Interactive design with test implementations before the final definition would be the best remedy, but are very unpopular with people who are in control of money for development work.

It is therefore proposed to collect a set of sample problems which shall be tested for its representativity by user polls and afterwards used for e.g. evaluation of language features by test coding.

This study could be undertaken by a user's group or by a large software-house with a lot of application experience.

3) Evaluation of Ironman

The DoD-project is a fact of life and it is in good shape. Nevertheless there is continuous discussion whether its outcome will satisfy the needs of European Civilian Industry. This question should be answered only on the grounds of more detailed evidence.

It is therefore proposed to have the Ironman document reviewed by the LTPL-Group (with adequate secretarial support) in order to either identify possible differences with our point of view (and give solid justifications for this) or the possibility of adopting the document for our purposes.

4) Identification of advanced language features

The art of designing languages has made progress and it seems that certain problems on which we still discuss while trying to solve them by traditional means, do no longer exist when using more modern constructs.

One should therefore invest some manpower in identifying modern language elements which have already reasonably demonstrated their implementability and promise to make life for the user carier.

5) Identification and evaluation of I/O-mechanisms

For some people the discussion on the "right" I/O-mechanism has reached the quality of a religious issue.

Given the scarcity of manpower in the group and in order to be able to make a decision on more solid grounds, several existing I/O mechanisms shall be identified, explained, their range of applicability, their

advantages and shortcomings discussed. They should be clearly different in order to ensure an adequate broadness of view.

This item of work could best be done by a research institute.

6) Identification of software tools

This item should give some case studies of the components of and the interactions in a software production system and possibly identify the iterrelations between the language and other components.

7) Studies on language-to-language-translation

As a key issue for the success of the whole LTPL-adventure always an easy transition from "old" to "new" languages has been mentioned.

According to the principle that decisions should be taken on the grounds of identifiable facts a survey on successfull (or their opposite) cases of language-to-language-translation shall be undertaken.

Annex 2 (Added 24th Oct 77)

The matter of the Ispra motion on cooperation with DoD was settled without Mr. Elzer writing a letter, by phone calls and by discussion in the meeting of LTPL-C at Prudue in Oct 77, when the motion was passed.

CHAPTER V

REPORT OF THE PROBLEM ORIENTED LANGUAGES COMMITTEE

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REPORT OF THE POL COMMITTEE
INTERNATIONAL PURDUE WORKSHOP

The POL Committee has made a detailed review of the languages catalog form (POL-E) which will be used to gather information concerning POL's from implementors. This language catalog will be organized to provide information to the end user in selecting POL's for his application.

The catalog form was restructured to include sections on the user, the implementor and general topics.

The impact of micro computing technology on the goals and objectives of the POL committee has also been discussed at length. As a result of this discussion, action items were generated by the Regional POL Committees as follows:

I. POL-A will investigate and report on applications of micro computers for the direct implementation of POL's.

II. The work of POL-E is organized as follows:

1. A POL is not only a special application system which contains the solution of a user's (engineer's) problem but also a high order language which enables a user to program the solution himself on a very high level.
2. Therefore POL-E is analyzing the user requirements on POLs in a two fold manner:
   A) What are the user requirements on POLs in the sense of special application systems (top down approach)?

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B) What are the requirements on POLs in the sense of high order languages which enable the user to program individual (prototype) software and to construct flexible modules (of application systems) which are reusable in classes of applications (bottom up approach)?

The second approach is necessary because special application systems usually don't fit. They have to be adapted or extended and this work should be reduced by doing it on a high level.

3. There have been three initial presentations and a long discussion on requirements concerning 2 A) and 2 B) during the last meeting at Sept. 26-27, 1977. The results will be refined and extended until the next meeting on January 11-12, 1978. Then POL-E will also discuss special application systems programmed in realtime-FORTRAN and PEARL. Generally existing high order languages will be checked against the requirements.

4. The aim is to get a future oriented list of requirements which can be given to
   - other technical committees, especially LTPL (short-term),
   - users,
   - suppliers (producers) and
   - standardization groups (long-term).

CHAPTER VI

REPORT OF THE
INTERFACES AND DATA TRANSMISSION COMMITTEE

The following documents are included here:

1. Summary of Activities, TC5-C.

2. Report of TC5-E.

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International Purdue Workshop
Industrial Computer Systems

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

TC5: Interfaces and Data Transmission Committee

International Committee Meeting held at Purdue University
October 3-6, 1977

Summary of Activities

Attendance

Thirty-one members were present. An attendance list is attached.

TC5E Report (see Appendix I)

TC5E submitted a brief report, in the form of a telex, on their activities and future plans.

IEC-SC65A-WG6 (see Appendix II)

Three specific activities are included in the agenda for the next meeting in Vienna, October 12-14, 1978.

1) A drafting committee will be appointed to edit the functional requirements document and glossary, in preparation for submission to the IEC as an official technical paper. The WG6 secretary (Bob Crowder) recommends that a more suitable title be found for this document.

2) Methods and procedures will be developed for the analysis of candidate systems and the recording of the resulting data.

3) As the next phase of its work WG6 intends to prepare a draft standard.

Other WG6 Documents (Appendix II)

Messrs. Wood and Dorey have submitted a recommended terminology for communication networks (WG6 (Wood-Dorey)2).

Two papers by Dr. G. Funk compare the data reliability and efficiency of various protocols (WG6 (Funk) 2 and 3).

IEC-TC66-WG3 (see Appendix III)

A report was received from Mr. Dan Loughry on the proposed objectives for the serial extension of 66 (Central Office) 22, which is essentially the IEEE 488 bus. All members are urged to study these documents in detail before the next meeting.

Functional Requirements - Title

The meeting agreed with the proposal that an improved title be found. Wording such as "Data Highway for Distributed Digital Industrial Process Control Systems" would better identify the contents and intent of the document. The actual wording of the title was left to WG6.

Bit and Byte Oriented Protocols

Because of the wide spread adoption of HDLC and SDLC in North America and the international acceptance of HDLC, TC5 feels that HDLC-like protocols must be seriously considered for distributed industrial process control.

The work of Dr. Funk points out a source of error in bit oriented protocols. It is important to the work of this committee that the significance of this error, and methods to minimize it be examined. To this end the meeting passed the following motion:

> The TC-5 Interfaces and Data Transmission Committee of the International Purdue Workshop requests the assistance of the Purdue University in evaluating the work of Dr. G. Funk concerning data transmission reliability presented in the following documents:
>
> 1. Comparison of data reliability and efficiency in various standard protocols for information exchange in computer telecontrol networks. IEC/SC65A/WG6(Funk)2
>
> 2. Standard reliability requirements for data transmission. IEC/SC65A/WG6(Funk)3

The work assignment of the Purdue representative will include an overseas trip to Brown Boveri & Co. Ltd. in Baden, Switzerland (payment to be solicited from P.M.C.) to meet with Dr. Funk.

The intent of the work effort will be as follows:

1. Determine the arithmetic discipline and basic assumptions used to formulate the conclusions. Re-state these assertions in lay terms.

2. Determine the validity of the discipline and assumptions as applied to industrial communications. Determine the order of magnitude (translated into potential failure of communications (time period) of the reliability conclusions.

3. Present to the TC5 group a paper stating in lay terms the applicability and concerns of the HDLC, bit-stuffing protocol, in terms of potential message failure in time where messages are bit-oriented and where message are byte-oriented.

4. Present to TC5 any message encoding techniques for the HDLC protocol which would yield an order of magnitude increase in reliability of communications.

5. Present to TC5 any postulated encoding technique whose analysis yields more reliable message traffic stating trade-offs made using this technique against, for example, the HDLC protocol. Specifically include any protocols proposed by Dr. Funk.

6. Present to TC5 a comparison of features of the HDLC protocol (considered from a theoretical communications viewpoint) as opposed to other protocols considered, viz: fixed word format, byte format, etc.

It was further agreed that this motion should be presented to the full Workshop for a vote.

(Chairman's Note: The Workshop voted unanimously to support this motion.)

Mr. Harvey Shepherd agreed to form a sub-committee to manage the work.

Clarification

During the course of the meeting it became evident that there was some uncertainty as to which level in an industrial computer system the Committee was addressing.

Appendix IV contains the block diagram used during the initial discussions on this subject by the Committee in 1975. It was agreed at that time that the relevant interface is the one labeled

"# 10 - Derived Channel".

Analysis of Candidate Systems

A sub-committee, composed of Messrs Barsamian, Diefenderfer, Crowder and Sanders, was formed to be responsible for the preparation and continued refinement of a suitable format to facilitate the analysis of candidate systems and the comparison of alternate implementations.

Honeywell TDC 2000 (see Appendix V)

Mr. Diefenderfer gave an excellent presentation of the TDC 2000 system together with a comparison on the format of the Japanese proposed guideline.

Fibre-Optics Presentation (see Appendix VI)

Mr. C. Podlesny of the Galileo Electro-Optics Corp. discussed the characteristics and performance of commercial fibre-optic cables.

SDLC Protocol Controller (see Appendix VII)

Mr. John Wipfli of Intel Corp. described the INTEL 8273 SDLC protocol controller chip.

Future Mission

Many members have now responded to the request for suggestions as to the future direction, objectives, and time scale of the Committee's activity. A summary of this information will be prepared for the next meeting.

Workshop Panel

During the Workshop, a panel session "The Impact of New Trends in Hardware on Computer System Interfaces" was held. Copies of the presentations by Tony Deramo, Chas. Farmer, and Dan Sze are included in Appendix VIII.

MIL-1553B

Appendix IX contains a copy of the proposed MIL-STD-1553B which supersedes MIL-STD-1553A.

Candidate Systems

Members are urged to propose and/or solicit implementations for analysis as candidate systems.

Future Work

At this point in time, with WG6 assuming the job of editing the functional requirements, the Committee can concentrate on the analysis of candidate systems and the development of specifications.

At the next meeting, agreement should be reached as to which specific areas of the functional requirements will be the starting point for the preparation of detailed specifications.

Next Meeting

The next meeting will be held January 12-13, 1978 at IBM Corp., Boca Raton. Dr. Sze will host this meeting. He has arranged for a Series/1 Architectural tutorial for the afternoon of January 12 and an SDLC tutorial for the morning of the 13th. A plant tour will also be scheduled.

R. W. Gellie

RWG:mf

R. W. Gellie,
Chairman.

International Purdue Workshop
IPW
Industrial Computer Systems

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

ATTENDANCE LIST, OCTOBER 5, 1977

BARSAMIAN, Ara	Exxon Research and Engineering Co.
BUTEMEYER, Dean K.	Texas Instruments
CAMPBELL, Bob	General Motors
COX, Jeffrey A.	Universal Cyclops
CREEKMORE, Earl E.	Inland Steel Co.
CROWDER, Robert S., Jr.	E.I. du Pont
DERAMO, A. D.	Westinghouse Electric Corp.
DIEFENDERFER, C.	Honeywell P.C.D.
DRAKEFORD, J.	Intel Corp.
DUNCAN, Walter A.	ACCO-Bristol
FARENHOLTZ, Tom	Cominco Ltd.
FARMER, Charles	Honeywell
FULLER, H. J.	Worcester Controls Corp.
GELLIE, R. W., Dr.	National Research Council of Canada
GRAUBE, Maris	Tektronix
HALSALL, J. R.	I.C.I. Limited
HAROLD, Robert A.	Samborn, Steketee, Otis and Evans
HARRISON, Thomas J., Dr.	IBM Corp.
IDO, Ichiro	Jamatake-Honeywell Co. Ltd.
KATO, Masayasu	Hitachi, Ltd.
KLAHN, James B.	Applied Automation Inc.
LEE, Kenneth	Eastman Kodak Co.
MILLER, Donald	Sterling and Assoc.
OWENS, James E.	Aluminum Co. of America
PENNING, David C.	SRI International
SANDERS, Richard P.	Fischer and Porter Co.
SELLIX, Eric G.	Leeds and Northrup Co.
SHEPHERD, H.	The Foxboro Co.
SZE, Daniel T. W., Dr.	IBM Corp.
VANDERBRUG, Gordon J., Dr.	National Bureau of Standards
WILLMOTT, T. L.	Bailey Meter Co.

Affiliations
Purdue University
Instrument Society of America through Data Handling and Computations, Chemical and Petroleum Industries, and Automatic Control Divisions
International Federation for Information Processing as Working Group WG5.4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology
Institute of Electrical and Electronic Engineering, Data Acquisition and Control Committee of the Computer Society, and Industrial Control Committee of the Industrial Application Society
International Federation of Automatic Control, Computer Committee
National Research Council of Canada, Associate Committee of Automatic Control
Commission of the European Communities (CEC) through its Directorate General for Industrial and Technological Affairs
Japan Electronic Industry Development Association (JEIDA) through its IPW Japan Committee

KARLSRUHE, DEN 23.9.77 11.25 H
FS. NR. 06123 / MO

N. E. MALAGARDIS
IRIA
ROCQUENCOURT
FRANCE

RESPONDING TO YOUR MESSAGE OF SEPTEMBER 9 HERE IS MY SHORT REPORT ON TC 5 ACTIVITIES AND FUTURE PLANS:

THE TC 5 WORK IN THE LAST YEAR MAY BE TYPIFIED AS AN EXTENSIVE DISCUSSION OF THE COMMITTEES DRAFT FOR A SERIAL LINE SHARING SYSTEM FOR REAL TIME APPLICATIONS (SIR). THE DISCUSSION TOOK PLACE WITHIN TC 5 AS WELL AS IN INTERNATIONAL STANDARDIZATION COMMITTEES. IN COMMENTS AND CRITICISMS THE INCOMPATIBILITY WITH HDLC AND THE LACK OF PROCEDURES FOR TRANSFERRING BUS CONTROL FUNCTIONS FROM ONE STATION TO ANOTHER, THE SO-CALLED MASTER TRANSFER, WERE POINTED OUT AS DISADVANTAGES.

THEREFORE THE 5TH SUBGROUP MEETING WAS EXCLUSIVELY HELD TO INVESTIGATE THE APPLICABILITY OF HDLC AND SDLC FOR SIR. AS FURTHER CONSEQUENCE THE PRESENT WORKING PLAN PROVIDES THE IMPROVEMENT OF SIR BY MASTER TRANSFER CAPABILITIES AND ADDITIONAL BY PROCEDURES FOR DIRECT COMMUNICATION BETWEEN ANY TWO BUS STATIONS WITHOUT INVOLVING THE PRESENT BUS MASTER (CROSS COMMUNICATION). APPROPRIATE PROPOSALS GENERATED BY COMMITTEE MEMBERS FORM THE BASIS FOR THE NEXT TC 5 SUBGROUP MEETINGS. THE WORK IS SUPPORTED BY PRACTICAL EXPERIENCES GAINED WITH PROTOTYPE PDV-BUS SYSTEMS IN GERMANY WHICH ARE SIMILAR WITH SIR.

IT IS INTENDED TO PRESENT THE IMPROVED SIR DRAFT AT THE NEXT ANNUAL MEETING OF PE.

H. WALZE / PDV
GESELLSCHAFT FUER KERNFORSCHUNG MBH

CYCLADE 690109F
7826484Z KFK D

CHAPTER VII

REPORT OF THE
MAN/MACHINE COMMUNICATIONS COMMITTEE

The following documents are included here:

1. Minutes of the TC6-C Meeting of October 3-6, 1977.
2. Annual Report 1966-67, TC6-E (Revised).
3. Reasons for Implementing and Not Implementing Modern Man-Machine Interface Functions.

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TC-6 MAN/MACHINE COMMUNICATIONS
INTERNATIONAL MEETING 1977 MINUTES

The attendance was good at each session. The American Committee is remaining fairly constant with about 15 working members.

Four main items were put on our work schedule. These were:

1. Finalization of Bibliography Catagorization.
2. Device Independent Language Specifications if possible. (WG 1)
3. Justification for MMIF. (WG 2)
4. Updating of Guidelines (WG 3)
   a) With Respect to PE TC-6 work about the User - Who Is It.
   b) With Respect to Microprocessors/ Microcomputers.

It was decided to work on items 2 and 4 since these are interrelated.

A list of some 35 items or tasks that could be performed at a MMIF was prepared. Another list of users and definition of the user was prepared. We have seven defined users. It is to be understood that there may be more than one level of each type of user.

From these two lists a cross reference matrix was obtained. This initial effort will be distributed to all TC's for

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comments, additions and deletions.

Discussions concerning our liaison with other groups was reviewed. We are inviting groups such as Human Factor Society members to join us at Purdue. Other contacts are being made and reports of groups such as the IEEE Nuclear group are being collected for study.

R. Thompson will act as Sub-chairman of revisions on the Guidelines.

R. F. Carroll

ANNUAL REPORT 1976-77, TC6-E

The Man-Machine Communications Committee (TC6) is now composed of a fairly stable group of active members (10 members from 8 European countries).

The committee has found that information about Purdue Europe and the activity of each committee to the users of its results is very important. A brochure presenting Purdue Europe and the work of TC6 has been printed and is now being distributed by each committee member on a national basis.

The work on a questionnaire covering the field of "User interface in process control within European industries" has been finished. A report presenting the results from the analysis of the collected information is available. Press release will be sent to European and International magazines for a wider distribution.

Many presentations by technical committees have referred to the user in widely differing contexts. To clarify this matter TC6 has produced a working paper with the title "Towards meeting the needs of the user". This paper has been distributed to the other TC's of Purdue Europe for further discussion and comments. Based on feedback from the committees,we shall try to analyze the problem somewhat further and present the results in form of a working paper.

The committee has continued its work on establishing a general guideline for the design of Man-Machine Communication (MMC) Systems. At present the main activity is directed

towards a way of influencing the design procedure more than the implementation. This work contains activities such as:

Analysis of and comments of the US Draft Guideline on Design of Man-Machine Interface in Process Control.

Cooperative work with the US TC6.

Work on new ideas for establishing a framework of a General Guideline for MMC in Industrial Computer Systems.

Seek for financial aid from CEC and other organizations in order to increase the activity of establishing such a Guideline. TC6's scope of work is too large to be covered by TC6 members on a voluntary basis. A working paper with the title "Automation and Man-Machine Communications - Aims and Activities of TC6" has been presented to the CREST subcommittee on Informatics of the Commission.

Furthermore plans have been made for a workshop where the committee's ideas can be discussed and commented on by people from European industry and R&D organizations in this field. A round-table discussion on MMC will be organized at the IFAC Congress in Helsinki, June 1978 by members of the committee.

Some time ago the committee started work on collecting information about European organizations working in the field of Automation - MMC - Human Factors (Ergonomics). Draft paper available. In due time this information will be available in form of a survey paper. A liaison with the ISO/WG on Standardization in Ergonomics will be established in the near future.

Last but not least, the committee members have frequently presented the aims and work of Purdue Europe and especially that of TC6 in their respective countries.

From our last TC6 Meeting:

The creation of Guidelines on MMC is closely related to Guidelines for Systems Design, e.g., one cannot disconnect these two activities at any time during the design phase.

We have also found it necessary to work more with glossary - the meaning of words, such as: jobs, tasks, procedures, activities, functions - is not very clear. We therefore have to define some of them our way. A correspondence with software people's use of them is not clearly seen.

R. Thompson has asked us to look into the possibilities of judging utilization of Guidelines for contracting purposes.

REASONS FOR IMPLEMENTING AND NOT IMPLEMENTING MODERN MAN-MACHINE INTERFACE FUNCTIONS

REASONS FOR IMPLEMENTING MODERN MMIF

1. Operations manpower reduction (greater no. of loops handled).
2. Reduces operator error (saves process downtime and improves product quality).
3. Reduces overall size of control room.
4. Reduces maintenance (fewer controls & indicators).
5. More adaptable to process growth and charge.
6. Implementations using modern hardware are more reliable.
7. Availability of the MMIF will be as high using modern equipment and architectures as older designs.
8. Job enrichment for the operator.
9. Eases operator training (new operators especially).
10. Lower installed cost for MMIF (especially for larger systems - eq. cabeling).
11. May be replacing non replaceable instrumentation (not making anymore).
12. Process optimization may be lesser.
13. Better managerial capability.
14. Compliance with Government Regulations.

REASONS OFFERED FOR NOT IMPLEMENTING MODERN MMIF

1. Existing (experienced, lower level) people may not be capable of being used to design and implement the MMIF for a new system. They feel more secure with the existing design and implementation.

2. Existing technology can be used. This offers less risk and is more available and better understood.

3. Less design time and money are required by retaining the existing design.

4. The operations and maintenance people and practices may be different with a new design.

5. Misunderstandings of:
   - 5-1 Cost of new MMIF
   - 5-2 Area of impact - will it be overkill?, too elegant?
   - 5-3 Effects on operating people and their jobs
   - 5-4 Not directly related to profits (the "business" of the corporation)

6. New MMIF frequently increases the degree of abstraction of the process.

7. New MMIF frequently requires a more sophisticated CPL system than would otherwise be required.

8. Less reliable due to common hardware.

9. Government Regulations.

REASONS OFFERED FOR NOT IMPLEMENTING MODERN MMIF (Cont.)

10. Possible Union/Operator Concern/Job Dislocations.

11. Environment.

COSTS INCURRED BY MODERN MMIF

1. Additional design costs
   - training
   - staffing
   - contractors

2. Additional maintenance costs
   None - probably less

3. Additional training costs
   - maintenance people

4. Additional hardware and software costs
   - CPU system is more complex
   - risk of new technology

These cost items must be balanced against savings in operations manpower, (reduced operator error, and smaller control room).

CHAPTER VIII

REPORTS OF THE SYSTEMS RELIABILITY SAFETY AND SECURITY COMMITTEE

The following documents are included here:

1. Report of the Systems Reliability, Safety and Security Committee.
2. Minutes, September 29, 1977 Meeting, TC-7, Purdue Europe.
3. Brochure, TC7-A.

INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE LABORATORY FOR
APPLIED INDUSTRIAL CONTROL
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907, USA
317/494-8425

Please reply to:

COMMITTEE TC-7

System Reliability, Safety and Security

Purdue University

West LaFayette, Indiana, USA

Oct. 3 - 6, 1977

Committee Chairman - R. W. Yunker

Participating Members: William V. Brown
Dr. Rudolph Kanokovsky
Purdue Europe
Ichiro Ido - Purdue/Japan

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Affiliations:
Purdue University
Instrument Society of America through Data Handling and Computations, Chemical and Petroleum Industries, and Automatic Control Divisions
International Federations for Information Processing as Working Group, WG5-4. Common and/or Standardized Hardware and Software Techniques of Technical Committee, TC-5, Computer Applications in Technology
Institute of Electrical and Electronic Engineering, Data Acquisition and Control Committee of the Computer Society, and Industrial Control Committee of the Industrial Applications Society
International Federation of Automatic Control, Computer Committee
Commission of the European Communities (CEC) through its Directorate-General for Industrial and Technological Affairs
Japan Electronic Industry Development Association (JEIDA) through its IPW Japan Committee

The International TC-7 committee convened with representatives from TC-7 Purdue Europe, TC-7 Purdue Japan and two American Representatives.

Presentations were made on the progress being made in the respective areas toward the individual goals.

Purdue - Europe countinues its very active program under the direction of Professor Lauber. Dr. Rudolph Kanokovsky representing Professor Lauber submitted a booklet of 12 papers published by the committee in the field of Safety and Security; together with a bibliography of all papers to date. It is well to note that this prolific group has over 129 papers published at this time. All in English I might add.

They have approximately a 41 member group divided into 24 active participants member and 17 corresponding members. To be elected a full member of the committee requires participation in the 3 or 4 meetings held during the year in Europe and the presentation of one or more papers.

As they are a large committee they have found it expeditious to organize into 5 sub-groups. These are:

1) Terms & Definitions
2) Project Management
3) Hardware
4) Software
5) Documentation

Their committee emphasizes Safety of Computer Systems in their programs. This results somewhat (as to be expected) from the backgrounds of their members, being largely Nuclear and Railroads, together with Universities associated with programs in these activities.

Their present area of emphasis is in developing Software Guidelines & Statistical testing. In addition they have expanded their terms and definitions, adding 30 - 40 New terms.

Of particular interest to the committee are the papers on software reliability and guidelines for documentation. The International committee is particularly indebted to their committee for their pioneer work in publishing in these areas.

In the area of mutual interaction they have requested a bibliography of U.S. work in the field of software reliability. Which the U.S. committee will supply.

They have also requested an evaluation of their most recent glossary terms. These terms will appear in the minutes and I would like to ask that each of the TC committees review these terms and provide comments. I suggest that the most expedient method for doing this would be through the TC-7 committee.

Purdue - Japan's program was presented by their chairman Mr. Ichiro Ido.

Their committee consists of 16 members and a chairman, Mr. Ido. Each member representing a different company. The representation ranges from Electrical, Electronic and Instrumentation (and a Photo Film Company).
As a result they have a very broad based industrial participation.

The Committee acts as a sub-committee of JEIDA (Japanese Electrical Industry Development Association). As a result it is to be expected that their recommendations will not be taken lightly by Japanese Industry.

They are one of 5 committees in JEIDA. The others being Standards, Software, Hardware and General Survey.

The committee is divided into two working groups; Installation and Maintenance. Their strategy being that the field of Reliability, Safety and Security is very large and that they can best attack the problem initially in these two areas.

Mr. Ido presented an extensive paper, from the committee representing the work to date on "Proposed Guidelines for Environmental Standards for Industrial Computers." The paper encompasses Classification of Environments; Temperature, Humidity, Power, Noise, Vibrations, Dust and Corosive Gas provisions and influence; and finally a discussion on Computer Security. As such it is a very complete work and adds greatly to the mutual efforts of the other committees. It represented the work of a committee under the direction of Mr. K. Fuijta.

If these guidelines are accepted they will submit a second set on System Maintenance.

Mr. Ido has requested that similar efforts be started in the U.S. and European committees so that realistic international guidelines might be generated.

The general strategy of the Japanese Committee is to divide the scope into 4 areas. These are:

1. System Design
2. Operations
3. Installation
4. Maintenance

Their committee schedule indicates that Installation and Maintenance Guidelines will be concluded in 1978 and the Reliability area of System Design should be finished in 1978. This includes such things as definitions for MTBF and MTTR for industrial distributed control specifications. In addition, works on "Standardization of Hardware Proof Testing" and "Standardization of Documentation for Requirement Specification" are in the process by the standards committee and are being published.

The U.S. committee's progress to date was presented by Mr. Yunker. In essence, it said that after last years International Meeting from which Strategy, Scope and Objectives were developed, little progress has been made because of lack of participating members. While several efforts have been initiated to improve participation they have not as yet been successful. Chief among these is a brochure, modeled after the immparently successful TC-7 of Purdue Europe which has jsut recently been sent out. Suggestions and comments were solicited from the committee members.

Mr. William Brown of the Celanese Corporation, the third committee member made several valuable suggestions on personnel to be contacted as potential member candidates.

After the individual committee reports, we attempted to further clarify individual company and committee goals. Discussion relating to safety versus reliability, redundant systems, "How do you maintain a safe-reliable system given the possible untested probalistic pertabations and combinations in a computer operating system, coupled with the same order of probabilities in an application system." "How do you handle reliability in distributed systems, and how do the particular countries report reliability, and some of the problems involved." All these discussions contributed to each of our understandings of the particular problem and also clarified our definitions. This in spite of the distinct disadvantage our European and Japanese counter parts had in communicating there exact thinking in our native tongue.

To Summarize:

As a result of this meeting:

The U.S. TC committee will continue and intensify its efforts to attract more members. Along this line, we tentatively plan to invite major industry process control managers to participate. We would hope that present attendees to the conference will make appropriate people in their respective organizations aware of this and they can. If interested, contact: R. W. Yunker
% PPG Industries
One Gateway Center
Pittsburgh, PA 15222
(412) 434-3377

Together with Mr. Brown we believe we can in this way form the nucleous of a group which will encourage more U.S. participation.

We will supply TC-7 Europe with a U.S. bibliography on "Software Reliability." Also consideration of the Japanese guidelines for Environmental standards will be made with general U.S. standards.

Finally, we hope that we can continue to have the excellent interchange and information discussions that characterized our Committee's meeting this year.

R. W. Yunker

R. W. Yunker
Chairman TC-7

RWY:kmd
Enclosure

Full Committee Meeting, Sept., 29.

1. Agenda
The agenda was approved.

2. Minutes
The minutes from the Vienna meeting (WP 117) were approved, as far as they were available. It was stated, that the minutes of the Project Management and Terms and Definitions subgroups were missing. They should be added to WP 117.

3. Member List
The following changes took place:

Dr. Drtil	replaced by Mr. Blaas
Mr. Ellison	corresponding member
Prof. Cortes	" "
Mr. Reinshagen	" "
Dr. Scotland	" "
Mr. Dahll	member
Mr. Daoud	deleted
Mr. Hedin	deleted
Mr. Heiner	member
Mr. Fangmeyer	corresponding member

Mr. Engler and Dr. Konakowsky stay as members. Changes of address or telephone numbers at Mr. Gayen, Dr. Genser, Dr. Vaid, Mr. Dahll.
In the future one should try to find a procedure to handle the member list more quickly.

4. EC and Purdue Europe

Mr. Thompson, an ancient TC 7 member, is now the EC secretary, who is responsible for Purdue Europe activities, since Dr. Diettrich changed to another department. He gave a presentation on the different groups and problems between the EC and the European Purdue Workshop. (See figure).

Important decisions are made by the Council of Ministers. This Council consults the EC official bodies, where DG 3, to which Mr. Thompson belongs, is one. Should any projects been funded, DG 3 would supervise them. So far TC 3 has applied for getting EC support. Up to now however nothing has been decided. It is improbable, that anything could start in 1978.

In addition to DG 3 the Council of Ministers consults the Working Group on Standards. This group is complementary to the national standardization bodies. It has been founded in anticipation to a need. The 16 members have been appointed by the governments. Standards in informatics are planned. Up to now, no scedule of working exists. The commission normally does, what the WGS advises.

The individual TCs of the European Purdue Workshop fit more or less into the standardization activities. TC 5 e.g. can help another interfacing committee. In this case the EC will pay for travelling and other costs of interaction. TC 6's aims can not so easily be subsumed under standardization. The work of TC 1 however fits very good.

Concerning world wide standardization it is necessary to influence the national standards bodies, in order to get their support in the ISO.

If TC 7 wants some funding from the EC, the opinion of the CREST committee is important. This committee should be influenced. Since however many sides apply for money from the EC, one should only take into account a small study, achieving one particular goal. The EC so far did not give special attendence to the fact, that work on Safety and Security has legal aspects as well as technical ones.

According to the EC's opinion the EPW should help to use European standards and thereby be complementary to the WGS. To get some reasonable results a lot of volontary work will be necessary.

Mr. Thompson is interested in TC 7's work. He intends to come to each meeting. In order to keep informed, what the committee does, he will collect the working papers. His advice is, TC 7 should find and keep close contact to CREST and WGS on the one side and to the national standardization bodies on the other.

5. IFAC

The panel discussion proposed by TC 7 was accepted.

6. Report on state of Safety Methods in the US

Dr. Cooper gave a presentation of his impressions from the conference in Pittsburgh in the software subgroup. They are written down in WP 130, which is available for all members.

Then Dr. Cooper presented his paper of the Pittsburgh Conference, entitled "Some Reliability Aspects of the Design of Computer Based Safety Systems". This paper was distributed as WP no. 125. A report on that subject

will be available later. It also will be distributed to the committee. The discussion centered on the reliability figures, which the system should meet and on the question whether in addition to a formal specification an informal one should be required.

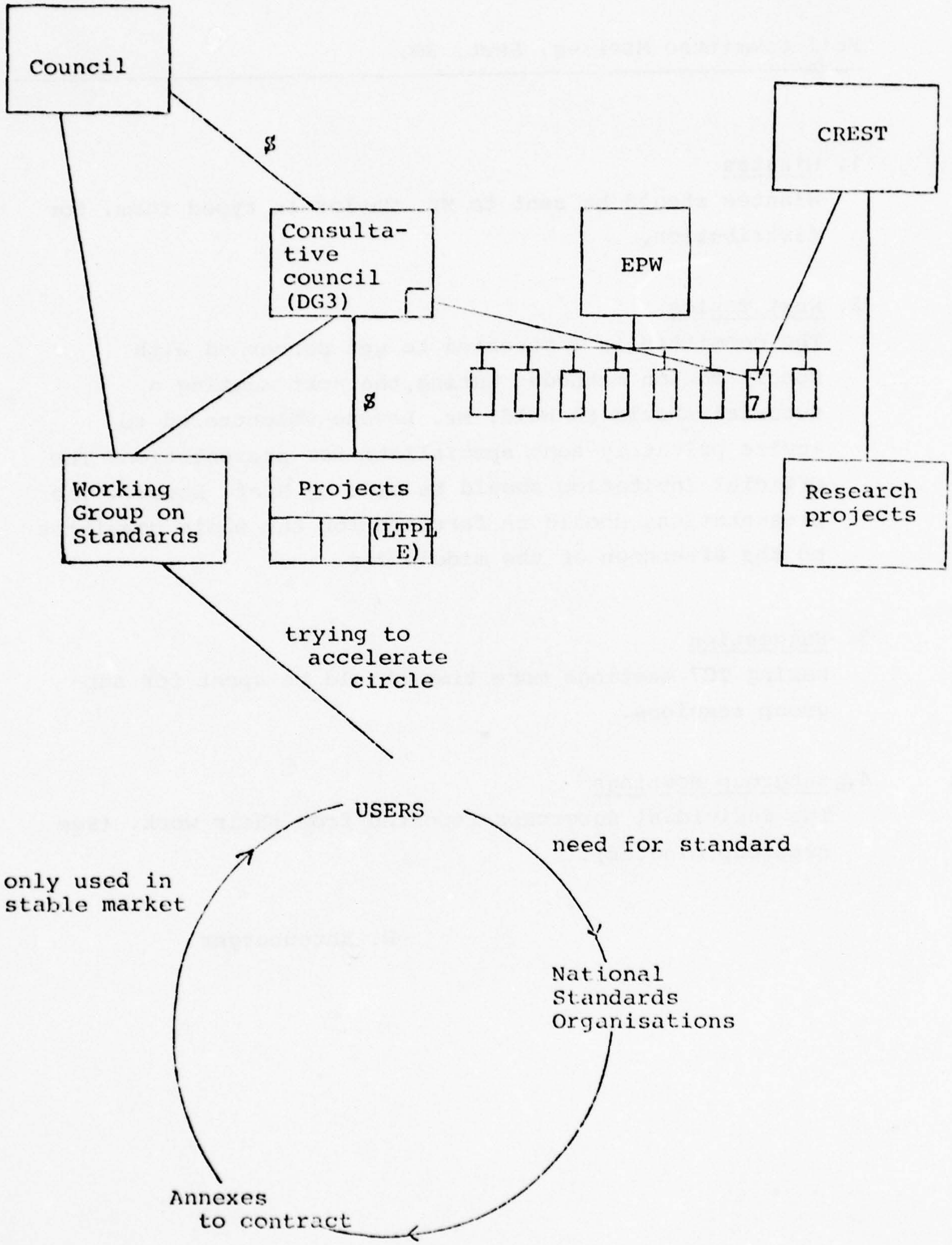
7. Next Meeting

The next meeting will be in Brussels, Jan. 18.-20., 1978.

8. Miscellaneous

Mr. Aitken asked for probability models for software. Messrs. Scotland and Cortes presented themselves to the committee.

W. Ehrenberger



RELATIONSHIP BETWEEN EUROPEAN BODIES AND COMMITTEES

Full Committee Meeting, Sept. 30.

1. Minutes

   Minutes should be sent to Mr. Taylor in typed form, for distribution.

2. Next Topics

   The committee is interested to get concerned with specification methods. During the next meeting a tutorial should be held. Mr. Levene volonteered to invite privately some specialists for presentation. The official invitation should be made by Prof. Lauber. The presentations should be fareseen for the whole committee on the afternoon of the middle day.

3. Suggestion

   During TC7 meetings more time should be spent for sub-group sessions.

4. Subgroup Meetings

   The individual subgroups reported from their work. (See subgroup minutes).

W. Ehrenberger

Minutes of Documentation Subgroup 29.9.77

Matters arising from previous meeting

1. Action of Mr. Schlesinger - he now hopes to complete his paper for next meeting.

2. Revision to FIPS 38 (see Paper 118): Development (Management) and Technical description aspects should be separated.

3. Documentation sub-group will concern itself in detail in Systems Requirements and Descriptions. Part 5 is to be the responsibility of the Project Management Subgroup.

4. It was agreed that "ancilliaries" (Part 7), could be called "Associated Equipment and Software".

5. The boundary definition is to be more clearly defined by the System Requirements working party.

6. Action to contact L. Goodstein is on R. Taylor.

7. 4th para. page 3 of previous Minutes is satisfactory, therefore 1st para. is to be deleted.

8. Pre-development studies and analyses should be included in Part 4 (Tech. Support Documentation).

9. Correction to p. 4: Part 3 working party to be entitled "System Description".

10. The Sub-group then split into the following parties:

    System Requirements (Part 2)

    H. Fangmeyer
    U. Voges
    G. Winter
    W. Grauwiller
    B. Sterner

    System Description (Part 3)

    A. Levene
    K. Scotland
    S. Bologna
    W. Hockey
    A. Costes
    G. Dahll
    S. Vaid

Technical Support Documentation (Part 4)

R. Genser
P. Sjölin
W. Ehrenberger

11. The System Description working party concentrated on aspects of the system level documentation, with five sub-sections:

   i) Overview
   ii) Subsystems & Interfaces
   iii) Description of implementation of required functions
   iv) Overall management of systems: configuration & re-configuration of system.
   v) Maintenance policy.

12. The working party agreed to consider in detail the points raised in TCSS 113 within the structure of TCSS 118.

13. Action on Mr. Costes to prepare content for hardware system description, other members to prepare content of software system description.

14. Dr. Ehrenberger agreed that the Technical Support Documentation Working Party would consider the economic aspects of the provision of documentation for a project.

Minutes of the Software Subgroup Meeting, September 28.

Present:

Gajen	Levene	Vaid	Dahll
Sjölin	Cooper	Fangmeyer	Bologna
Heiner	Grauwiller	Voges	Ehrenberger

1. Minutes Last Meeting

   The minutes are included in WP 117. They were accepted without any comments.

2. Report from Pittsburgh Conference on Software Reliability July 1977

   Dr. Cooper presented working paper no. 130. His major impression was, that concerning software reliability in nuclear power plants, European knowledge is not inferior to US.

3. Systematic Testing

   3.1 S a d a t

   Mr. Voges presented working paper no. 121, which describes a system analysing modules of FORTRAN programs.

   During the discussion the following points were stated: Presently a module to be analyzed can be up to 400 statements long. If the number of iterations of a loop is unknown, 2 or 5 repetions are investigated, if no other requirement is explicitly given.

   Subroutines are considered as new modules. They are therefore analyzed separately. The analyzer puts no requirements on the structure of the analysis object and does not check whether structuring rules have been fulfilled.

The system has been finished since one month. 4 to 5 man years effort have been involved, mainly from students. It is programmed in PL1, runs on an IBM 370/168.

Now a comparison with the american system RXVP from General Research is carried out.

3.2 Program Analyzer of Taylor and Bologna

Mr. Taylor and Mr. Bologna have designed and implemented a program analyzer in LISP. It is designed for analyzing programs written in IFTRAN. It runs on a Burrough B6700 in Risö and on PDP 11 in Cassaccia. Due to memory problems only programs with about 200 executable paths can be analyzed at the moment. Loops are investigated interactively with the programmer, who must indicate whether an additional repetition is wanted. The analyzer derives automaticly path predicates. An additional program simplifies them. Unexecutable paths are identified. Out of the large number of executable ones, the relevant paths are selected for further investigation.
An example shall be given during the next meeting. A working paper is planned.
The system is used to analyze the protection programs of the TAPIRO reactor from CNEN.

3.3 General

Mr. Voges' system found some inexecutable paths in one analyzed program. The analyzer of Taylor/Bologna so far did not detect errors.

4. Software Specification Methods
Mr. Ehrenberger presented working paper no. 123. A short discussion was devoted to the question, whether decision tables or logic diagrams were more suitable to specify reactor protection functions.

5. Definition of Software Reliability
It was discussed, whether the term "reliability" was suitable for software in the form as defined in the Terms and Definitions paper of the TC. No conclusion was found.

W. Ehrenberger

Terms and Definitions Subgroup

Minutes of the meeting in Brussel on 29th and 3oth September 1977

1. Present were: Mr. Aitken
   Dr. Frey
   Mr. Gayen
   Mr. Heiner
   Mr. Hendry
   Mr. Püntzner
   Mr. Schüller
   Dr. Schwier
   Dr. Wobig

2. The minutes of the previous meeting in Vienna were approved.

3. A proposal from Mr. Voges and Mr. Fanymeyer concerning the definition of the term reliability was discussed. The t & d members didn't see any reason to change the definition though it is not from our TC but applicable for us.

   Mr. Heiner proposed to define the term danger. A special definition is not necessary, because the technical use is in accordance with the dictionary.

4. Possible classification systems for the glossary of terms and definitions were discussed. The t & d agreed on a classification in alphabetical order. In addition one could try to show the relationship between the terms in a tree set or symbolic type of presentation; Dr. Frey, Mr. Hendry and Mr. Schüller volunteered to do so until the next meeting.

5. A proposal for a final subgroup paper was discussed and will be distributed at the next meeting in January 1978. This paper shall contain four columns as shown below

term	definition	source document	remarks

All terms will be listed up in an alphabetical order and the column remarks will contain cross references if necessary. We looked over the terms in section 1 and 2, discussing which parts were definitions and which remarks. The result can be seen from paper no 132. The titel of paper no 132 shall be

Glossary of Terms and Definitions
related to the safety of industrial
computer systems

6. The definitions of the terms in section 3 were discussed and moved up into section 2. These terms were: voter, decision logic, independent, standard, verification, prove, validate. The results will be given in the updated paper no 126. One will find some explanations given by Mr. Hendry in the end of these minutes.

7. The terms in section 4 were defined and moved up into section 3 for further descussion. On the whole we agreed on the definitons given by Mr. Hendry. The terms considered were: safety report, safety audit, demonstrate, regulations, dependability, threat, r out of n structure.

8. Explanation given by Mr. Hendry:

   We wish to distinguish between the verification, proving and validation of systems, software etc. We can identify a number of differences:

   a) Verification is the lowest level of testing, and is intended to show that the item works correctly with the input data and conditions used in the test. One or more sets of test conditions may be used, but the test does not show anything outside those conditions.

b) Proof shows that the item (or part of an item) will work for all relevant input data and conditions. A substantial proportion of argument or analysis is implied, although verification may be used to support the analysis.

c) Validation shows, in addition to proof, that the argument or analysis is valid under all reasonable conditions and is usually intended to give confidence in the proof or item under test. Hence, a customer acceptance or new product release is likely to require validation. Software validation usually involves soak testing, testing under severe conditions, with as many interactions as possible - "hammering" the system.

Gayen 19. 10. 1977

Technical Committee "Reliability, Safety and Security"

of the International Purdue Workshop on Industrial Computer Systems American Regional Organization

What is the International Purdue Workshop on Industrial Computer Systems? (IPW)

Founded

1969 by Prof. T. J. Williams at Purdue University, Lafayette, Indiana, USA

Objectives

To make the definition, justification, hardware and software design, procurement, programming, installation, commissioning, operation and maintenance of industrial computer systems more efficient and economical through education; the organization and interchange of information, and the development of standards and/or guidelines on an International basis.

Sponsors

Purdue University
Instrument Society of America
International Federation for Information Processing
Commission of the European Communities (CEC)
Japan Electronic Industry Development Association (JEIDA)
National Research Council of Canada

Affiliations

Institute of Electrical and Electronic Engineering
International Federation of Automatic Control

Organization

There are regional branches in America, Japan and Europe.

The American branch comprises the following Technical Committees:

TC1 FORTRAN Committee
TC2 Industrial BASIC Committee
TC3 Long Term Procedural Languages Committee
TC4 Problem Oriented Languages Committee
TC5 Interface and Data Transmission Committee
TC6 Man/Machine Communications Committee
TC7 System Reliability, Safety, and Security Committee
TC8 Real-Time Operating Systems Committee
TC9 Glossary Committee

What is TC7 Concerned With?

TC7 is concerned with *Reliability*, i.e., to establish procedures and practices for designing and operating computer systems reliably and with properly documented performance.

TC7 is concerned with *Safety*, i.e., to safeguard human well being, the environment and property against hazards arising from internal failure in computer control systems.

TC7 is concerned with *Security*, i.e., to establish safeguard practices and procedures to prevent deliberate or inadvertent computer operational failures.

What do the Programs in TC7 Deal With?

— exchange of experiences and ideas

— collection and evaluation of strategies

— establishing a catalog of proven schemes

— proposing to international standards bodies principles, procedures, and guidelines

— defining a list of terms and definitions to establish clear communication between professionals

Who can Benefit from TC7 Participation?

— industrial users

— *national authorities*

— research laboratories

— universities engaged in work on industrial processes, nuclear power plants, railways, and aircraft where reliability, safety and security standards with computer systems are involved.

How does the TC "System Reliability, Safety and Security" Interact with other Organizations?

TC7 cooperates with and participates in joint seminars with:

— the European and Japanese Technical Committees dealing with reliability, safety and security

— the sponsors of the Purdue Workshop

TC7 through the Workshop maintains liaison with:

— the American National Standards Institute (ANSI)

— the American Institute of Electrical and Electronic Engineers (AIEEE)

— U.S. Energy Research and Development Administration

— U.S. Nuclear Instrument Module Committee

What Results will be Produced by the TC "System Reliability, Safety and Security?"

The results will be contained in two types of papers:

— working papers — produced in written communication to the committee or technical journals, generated at the request of the committee or by the members

— guidelines — official recommendations to standardization authorities by the committee

The content of the papers will cover in content at least:

— design and development standards for reliable safe and secure computer systems

— verification of computer system performance

— hardware and software reliability standards

— definition standards for computer systems

What involvement is required of Members of the TC "Reliability, Safety, and Security"?

It is planned that the committee will meet four (4) times per year: twice at the semi-annual meetings of the International Purdue Workshop at Lafayette, Indiana; and twice at agreed upon convenient locations in the U.S. Some members take part in the International Workshop meetings in Europe.

The involvement of the TC7 members includes:

— preparation of papers

— review of papers

— presentations

— discussion in working groups

How does one become a member of the TC "System Reliability, Safety and Security"?

A candidate qualifies for membership by twice attending TC7 meetings. Those interested in the programs of the committee are invited to attend as guests. They should contact the Chairman of the TC:

Roy W. Yunker
Director, Process Control
PPG Industries
1 Gateway Center
Pittsburgh, PA 15222

Phone: (412) 434-3377

CHAPTER IX

REPORT OF THE REAL TIME OPERATING SYSTEMS COMMITTEE

The following documents are included here:

1. Minutes of TC 8
2. Up-to-Date Report TC 8

MINUTES OF TC 8

The main activities of TC 8 are still concentrated in Europe. For this reason, the International meeting was mainly used to present and discuss the Report I-1-6 of TC 8/E. In the many informal discussions, partly in connection with other TC's, there was a general consensus that the Report of TC 8/E was a considerable step forward towards setting up guidelines for a Real-Time Operating Systems. Several TC chairmen and representatives of both manufacturers and users have agreed to officially comment on that document. This will help future work of TC 8 to produce generally approved guidelines.

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INTERNATIONAL PURDUE WORKSHOP ON INDUSTRIAL COMPUTER SYSTEMS

PURDUE EUROPE

Technical Committee on Operating Systems

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Date: January 20, 1978	

Title: Up to Date Report

Abstract:

This report represents the conclusions reached to date by the Technical Committee No. 8 on Real Time Operating Systems of the PURDUE Europe Workshop. It is intended that this report be interpreted as a state of work paper for TC 8 and not as its final conclusions.

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TABLE OF CONTENTS PAGE

1. SCOPE AND GOALS OF TC 8

The scope of TC 8 on Real-Time Operating Systems is to consider DEFINITION, CONSTRUCTION and USE of Real-Time Operating Systems (RTOS). The goal of TC 8 is to make the construction of RTOS's more efficient and economical, and to attain maximum reliability and portability through the development of guidelines and machine independent concepts.

These guidelines and concepts should be achieved through the interchange of IDEAS and INFORMATION, through the use of a COMMON TERMINOLOGY and finally through the definition of an OPEN-ENDED MODEL of a RTOS together with rules for expansion and reduction.

The promotion of this model should be achieved by involving RTOS-constructors in the work of TC 8, by imparting the results of TC 8 in teaching and education and finally by proposing these results to the INTERNATIONAL PURDUE WORKSHOP and consequently to the appropriate national and international organizations responsible for standardization.

2. PROCESSES, PROCESSORS AND THE NEED FOR PROCESSOR MULTIPLEXING

Most real-time systems can be considered to consist of a network of intercommunicating processes running on a set of one or more processors.

A PROCESS is defined as an action in which the operations are carried out one at a time.

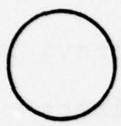
A PROCESSOR is capable of performing the operations (data manipulations) of a process (run a process). A processor can run at most one process at a time.

The maximum number of processes that can be physically run in parallel is equal to the number of processors.

Processors which are exchangeable with regard to the hardware configuration and the processes capable of being run by them can be treated as a PROCESSOR POOL and are dispatched with common dispatcher primitives. A processor pool with its set of exchangeable processors is identified by means of a PROCESSOR POOL DESCRIPTOR.

It is assumed that for each process which can run independently of others there exists a PSEUDO-PROCESSOR. All pseudo- processors have to be provided by the operating system. This requires the presence of some operating system primitives for processor multiplexing. The process is identified within the operating system by means of a PROCESS DESCRIPTOR.

It is convinient to represent a network of processes using the following diagrammatical notation:

 to represent a process

 to represent process-process communication

 to represent a processor or a pool of identical processors

An example of a network described in this manner is (fig 1).

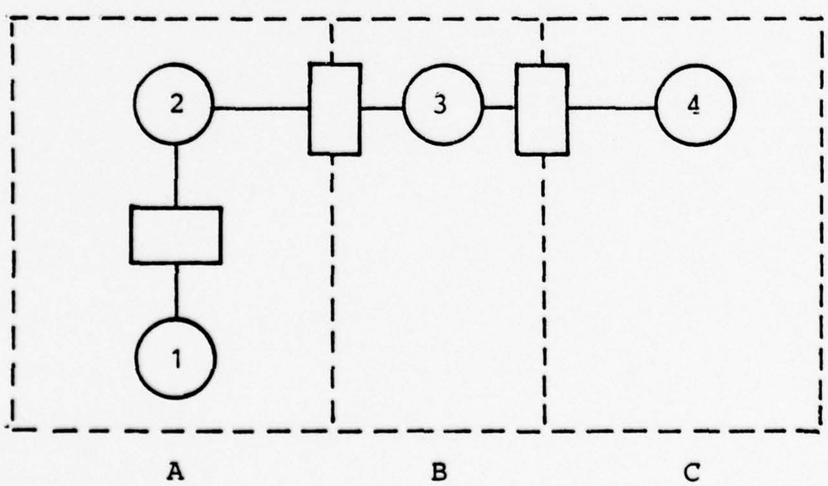


fig. 1

This depicts a network of four processes running on a three processor configuration.

3. STRUCTURE OF THE REAL-TIME OPERATING SYSTEM (RTOS)

There is a need to tailor the RTOS to specific applications. Tailoring is comprised of REDUCTION and EXTENSION of the basic RTOS. In particular this tailoring will include the provision of software interfaces to process peripherals. The fulfilment of this need for tailoring requires that the RTOS be highly structured and well engineered.

An approach embodying a hierarchical structure was adopted as a reasonable basis for the RTOS design and its logical management. The hierarchy is considered to consist of LEVELS OF CONSTRUCTION, where the realization of a new level from a lower level is achieved by a LAYER (fig. 2). The effect of each layer can be defined with respect to functions available at lower and upper boundaries.

This can be represented as follows:

```
           ----- ----- ----- -----
level 3   !  A  !  D  !  F  !  G  !
        -----------------------------
             .     .     .     .
             .     .    ..   ..
             .     .   .....
             .     .   ....
             .     . .....
             .     ...  ..
             .     .     .
           ----- ----- -----
level 2   !  A  !  D  !  E  !
        --------------------------
             .     .     .
             .    ..     .
             .  ...      .
             .  . .      .
             ....        .
             ...   .     .
             .     .     .
           ----- ----- -----
level 1   !  A  !  B  !  C  !
        --------------------------
```

fig. 2

The row of connected rectangles lists the functions available at that interface level. A lower boundary function may be transmitted without any change to the upper boundary (e.g. A) or made completely invisible (e.g. B). Some new functions, not available at the lower level boundary, can be introduced by the layer (e.g. F). These new functions will be implemented within the layer making use of the functions available at the lower boundary. This is optionally indicated by lines connecting functions at adjacent levels.

The model for a RTOS to be defined is a logical model, i.e. it is to be implemented by an appropriate combination of hardware

and software.

The KERNEL is considered as the layer(s) which provides any number of pseudo-processors by muliplexing (physical) processors. The kernel is considered essentially strategy independent.

There exist on each level of implementation naturally embedded strategies. The choice of appropriate data structures for representation of processes as well as the sorting algorithms used in the ordering or selecting of list elements are representative of these strategies.

The higher levels of construction are necessary to provide both a convenient and comprehensive interface for 'user processes' and higher level operating system functions.

4. BASIC SYNCHRONIZATION

It is important to recognize that any synchronization mechanism is repeatedly built upon a more primitive mechanism, with the most primitive being hardware synchronisation. Thus the hardware has to provide facilities to implement primitives which exclude simultaneous access to common data.

The existence of two synchronisation primitives, LOCK and UNLOCK, is assumed. Both are considered indivisible operations and are not simultaneously executable by different processors on the same variable. They allow the realization of the BUSY-WAITING state of the physical processors.

The LOCK and UNLOCK primitives are used to bracket operations

which have to be executed mutually exclusively:

```
LOCK (v)
    ...
    mutually exclusive operations
    ...
UNLOCK (v)
```

The presence of the parameter 'v' (LOCKVARIABLE) shows that different groups of mutually exclusive operations exist; only those using the same lockvariable mutually exclude each other. 'v' has two possible states: 'LOCKED' and 'UNLOCKED'. The locked state represents the fact that a process *is executing* mutually exclusive operations and that no other process is allowed to "pass" through the LOCK primitive (with the same lockvariable). The UNLOCKED state is the reverse.

In systems with only one physical processor the LOCK and UNLOCK primitives can be realized with interrupt inhibition. Whether it is posssible to differentiate between different lockvariables depends on the existing hardware (selective interrupt inhibition). Structure of LOCK and UNLOCK for single (physical) processor systems:

```
LOCK (v)
inhibit interrupts (selectively corresponding to 'v').
```

UNLOCK (v)

enable interrupts (selectively corresponding to 'v').

In systems with more than one physical processor a busy-wait loop for processors waiting for the lockvariable to be unlocked has to be provided. In addition, interrupts still have to be inhibited for two reasons:

- The time between the execution of the LOCK and the UNLOCK primitives has to be minimized, because during this time other processors may stay in busy-wait loops. Interrupts being serviced between LOCK and UNLOCK extend this time and should therefore be inhibited, if possible.
- A deadlock situation arises when a processor stays in a loop waiting for a lockvariable which has already been locked by the same processor. Such a situation is possible when the processor has serviced an interrupt between the execution of the LOCK and UNLOCK primitives. The corresponding interrupts must therefore be inhibited between LOCK and UNLOCK.

In multiprocessor systems the two primitives have the following general structure:

LOCK (v)

switches the processor executing this function into a non-interruptable mode and then checks whether the lockvariable 'v' is already in the locked state. If not, 'v' is locked and execution of the mutually exclusive operations is started. If so, the processor is switched back into the mode it was previously in and

the function is restarted at its beginning, thus leading to a busy-wait loop until the lockvariable is switched to the unlocked state by another process. This other process is presently executing mutually exclusive operations locked by the same lockvariable.

It is important that checking 'v' and putting it to the locked state is executed as an indivisible operation which itself must be mutually exclusive with other possible accesses to 'v'. This facility must be basically supported by the processor-hardware.

UNLOCK (v)

switches 'v' to the unlocked state and switches the processor back to the mode it was in before it executed the corresponding LOCK primitive.

5. BASIC SUPPORT FUNCTIONS

5.1 LIST-MANAGEMENT

A list is a possibly empty collection of elements, which share some common property. Operations on lists may take account of some ordering strategy.

Note: Lists may be implemented using
- linked lists in the conventional sense,
- fixed length arrays of elements,
- subsets of more general lists, with bits set to indicate membership of a particular list.

Within all levels of the RTOS kernel list management functions

are necessary. They are defined as follows:

INSERT (el,list)

inserts the element 'el' into the list 'list' according to some strategy.

REMOVE (el,list)

selects an element from the list 'list' according to some strategy and returns it in the parameter 'el'. The element is removed from the list.

LISTSIZE (list,lenght)

the actual number of listelements within the list 'list' is returned in the parameter 'length'.

NEXT (el,list)

based on the possibly implementation-dependant linear ordering of the list 'list' (e.g. increasing addresses, index of arrays, link chain, sequence according to some strategy) the function NEXT returns in the transient parameter 'el' the successor to the input element 'el' of the list 'list'. The element is not removed from the list. The first element of the list is obtained if input to 'el' is empty, i.e. the parameter 'el' contains a predefined empty element symbol (NIL). If the list is empty or no more successor exists the output to 'el' is the empty element symbol.

SEARCHFOR (el,list,id_attribute)

removes one element of the list 'list', which has the identification attribute 'id_attribute' and returns it to the parameter

'el'. If there is more than one element with such an attribute the selection is strategy-dependent. The attribute consists of at least a pair of parameters: The kind of attribute (perhaps denoted by an index within the listelement) and its special value, e.g. ('process',task1), ('priority',10), ('key',123). Output to 'el' is empty (NIL), if the list contains no element with the specified attribute.

CHANGE (list, id_attribute, change_attribute)

the list 'list' is searched for all elements with the identification attribute 'id_attribute'. Within these elements the value of the attribute specified by 'change_attribute' is reassigned. 'change_attribute' is of the same type as 'id_attribute' and contains both kind of attribute, which has to be changed, and the new value of that attribute.

5.2 Context Switching

The CONTEXT of a process is that part of the information belonging to a process, which, when the process is actually executed by a processor (process is in the RUNNING state, cf. par. 6), is located in processor-specific storage (locations and/or registers). This storage is used by all processes running on that processor. Although size and structure of a context may vary in a wide range, a context exists in every case.

That part of the context which is used by the kernel must be

saved on entering the kernel and is restored on leaving the kernel; some of these operations are performed by hardware (e.g. saving and restoring of program counter, processor status).

If, within the kernel, processes have to be switched, two functions operating on contexts are necessary:

SAVE_CONTEXT (process)

moves the context of 'process' into the process descriptor of 'process'.

RESTORE_CONTEXT (process)

restores the context of 'process' out of the process descriptor in a way that will enable the process to be continued on exit from the kernel. The initial state of the context of a process stored in its descriptor is defined such that the function RESTORE CONTEXT will enable the process to start correctly.

6. PROCESS- AND PROCESSOR-STATES

Within a multiprocessor kernel process- and processor- states have to be considered. The dispatcher primitives will cover all necessary state-transitions for processes and processors (fig. 3)

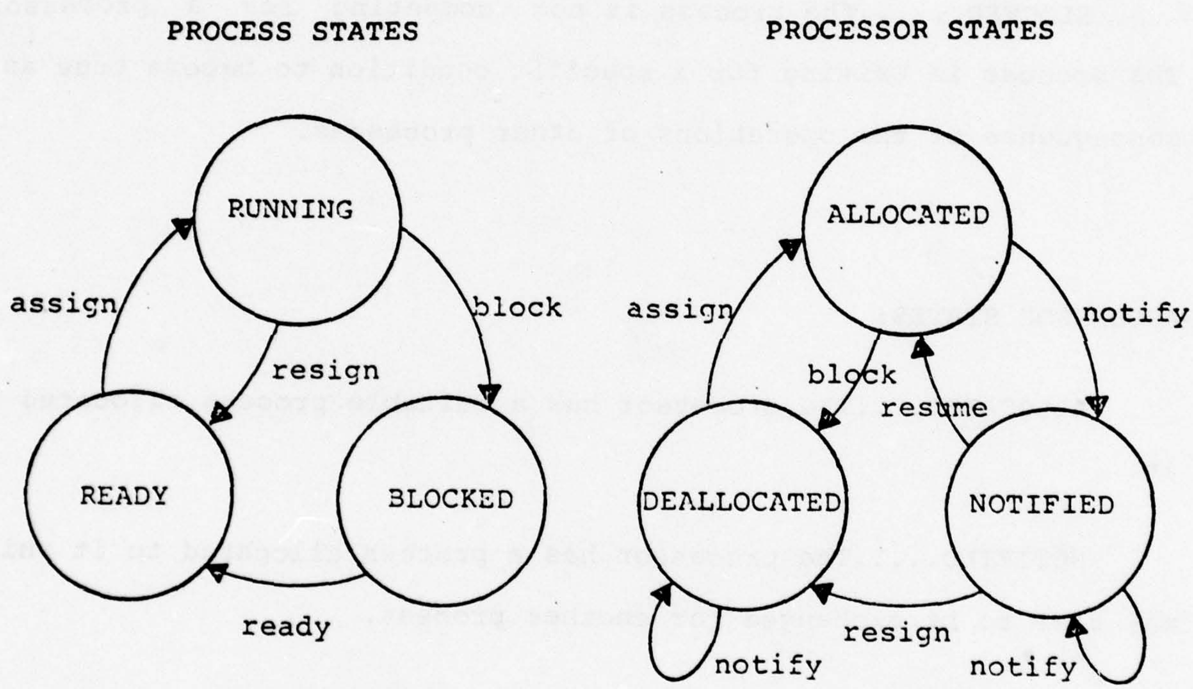


fig. 3

The ASSIGN, RESIGN and BLOCK primitives apply to both processes and processors. The READY primitive is unique to processes, whilst the NOTIFY and RESUME primitives are unique to processors.

PROCESS STATES:

RUNNING......The process has a suitable processor allocated to it.

READY........The process is competing for a specific processor or one of a pool of processors.

BLOCKED......The process is not competing for a processor. The process is waiting for a specific condition to become true as a consequence of the operations of other processes.

PROCESSOR STATES:

ALLOCATED....The processor has a suitable process allocated to it.

NOTIFIED.....The processor has a process allocated to it which may have to be exchanged for another process.

DEALLOCATED..The processor has no process allocated to it.

DISPATCHER LISTS

We assume the presence of different lists which are accessed and/or modified by the dispatcher primitives.

- Each process descriptor contains the following elements:
  - identification of the processor-pool which is considered to execute the corresponding process (this information may be implicite).
  - storage to save its context
- Each processor pool descriptor contains the following elements:
  - the identification of the RUNNING process (if any) for each processor of the pool
  - a list of all processes which are READY to run on that pool (READYLIST).

Note: Asynchronous program executions must exclude each other in time while accessing shared data. Regarding the data accessed by the dispatcher primitives, mutual exclusion is achieved using the LOCK and UNLOCK primitives.

DISPATCHER PRIMITIVES

ASSIGN

Removes a process (if there is any) from the readylist of the pool of the processor executing the primitive, assigns it to this processor, switches the removed process from READY to RUNNING and the executing processor from DEALLOCATED to ALLOCATED. It restores the context of the removed process calling RESTORE_CONTEXT.

If there is no READY process in the corresponding readylist, the processor remains in the DEALLOCATED state and waits.

Note: If 'idle' processes exist, there is always a READY process in the readylist and the processor will not remain in the DEALLOCATED state. If no 'idle' process exists, the REDISPATCH function (cf. par. 7) will cause the processor to leave the DEALLOCATED state. It is implementation dependent whether a processor waiting in the DEALLOCATED state should periodically check for the presence of READY processes. If not, the NOTIFY and REDISPATCH functions are mandatory, if yes, they may be omitted in non-preemptive systems (cf. par. 7).

RESIGN

Decouples the process from the processor executing the primitive and saves its context calling SAVE_CONTEXT. Inserts the process in the readylist of the corresponding processor- pool, switches the process from RUNNING to READY and the executing processor from NOTIFIED to DEALLOCATED. An embedded strategy for the ordering of the READY processes in the readylist is used by the called INSERT function.

BLOCK

Decouples the process executing the primitive from its allocated processor and saves its context calling SAVE_CONTEXT. Switches the process from RUNNING to BLOCKED and the processor from ALLOCATED to DEALLOCATED.

READY (process)

Switches 'process' from BLOCKED to READY and inserts it into the readylist of the corresponding processor-pool. An embedded strategy for the ordering of the READY processes in the readylist is used by the called INSERT function.

NOTIFY (processor-pool)

Switches a processor of the 'processor-pool' from ALLOCATED to NOTIFIED by sending a stimulus. If the processor receiving the stimulus is in the DEALLOCATED or NOTIFIED state, no change of state occurs. If the pool consists of more than one processor, selection of the processor receiving the stimulus is subject to some embedded strategy. (It is assumed that processors in the DEALLOCATED state, if there are any, are selected first.)

As a result of receiving the stimulus the processor will execute the REDISPATCH function (see par. 7).

Note: The reason for using a stimulus rather than a call to start the REDISPATCH function is that the sending and the receiving processor in general are not identical and executing completely *asynchronously* at the time of the notification. If the sending and receiving processors are identical, the NOTIFY primitive can lead to a direct call of the REDISPATCH function.

RESUME

Switches the processor executing the primitive from NOTIFIED to ALLOCATED. Thus, the processor will continue to execute its RUNNING process after leaving the kernel.

7. PREEMPTION AND PROCESSOR REDISPATCHING

Separation of a RUNNING process from its processor (executing the RESIGN primitive) in order to free this processor to ASSIGN another, presently more important process, is called preemption.

As opposed to the RESIGN primitive the BLOCK primitive is executed by a process which voluntarily stops execution and thus frees a processor.

Preemption is not necessarily a property of a RTOS. If there are either always enough processors to execute the necessary processes, or if the different competing processes are known to always execute the BLOCK primitive in time to allow the other processes to run correctly, a simpler model of process- and processor states and state transitions is possible (see fig. 4).

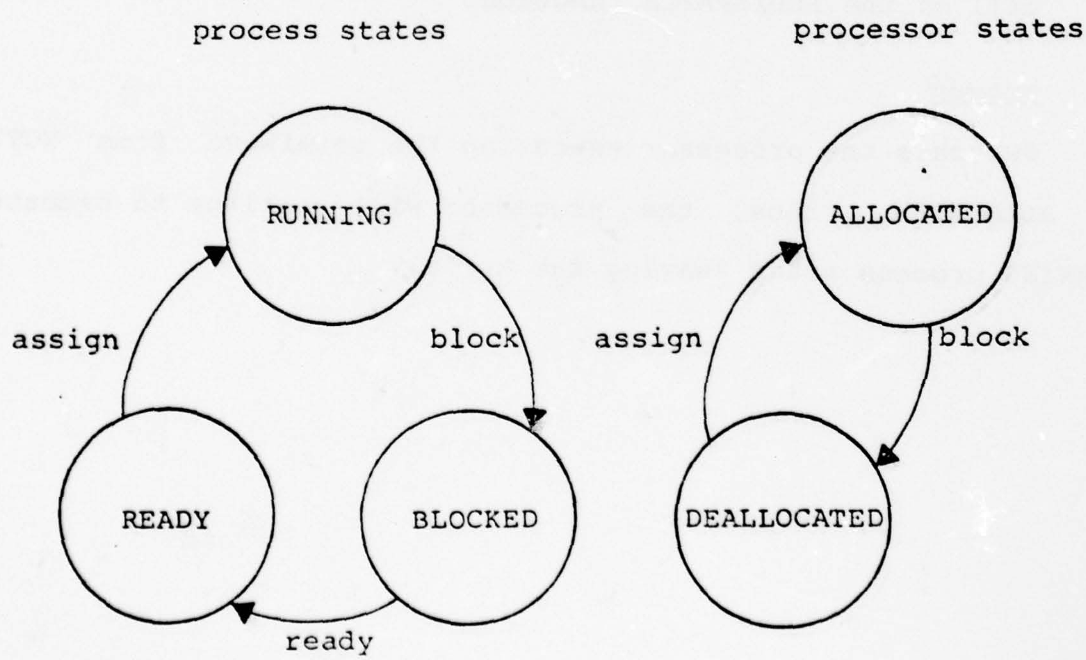


fig. 4

The RESIGN, NOTIFY and RESUME primitives and the NOTIFIED state are not contained in a system without preemption.

Note: A system with 'idle' processes will in most cases need preemption.

In systems with preemption a preemption may become necessary whenever a READY process has been added to a readylist or, more general, when changes have been made to the readylist. If after a change to the readylist a (possible) preemption is desired, the process which made the change has to NOTIFY the corresponding processor- pool. A processor of this pool will then execute the REDISPATCH function:

REDISPATCH

The processor executing this function is either in the NOTIFIED or in the DEALLOCATED state. In the DEALLOCATED state, it will execute the ASSIGN primitive and thus start execution of a previously READIED process, if there was any, or stay in the DEALLOCATED state. In the NOTIFIED state, it will check whether it is more important to RESUME its RUNNING process or to RESIGN this process and to ASSIGN a new one.

Note 1: The detailed construction of the REDISPATCH function is implementation-dependent. The RESUME function can be avoided, if the NOTIFY primitive is only executed when the conditions which lead to preemption are true. It also can be avoided, if the REDISPATCH function unconditionally RESIGNS the RUNNING process, even if this same process is then ASSIGNed again.

Note 2: The voluntary releasing of a processor by a process in favour of other processes is considered a preemption. Accordingly, such processes will execute the NOTIFY primitive which triggers the REDISPATCH function. Since in this case the sending and receiving processors of the NOTIFY-stimulus are always identical, simple implementations are possible (see par. 6, description of the NOTIFY primitive).

8. PROCESS MANAGEMENT

It is necessary to have functions for the CREATION and DELETION of processes and for the STARTING and TERMINATING/ RETIRING of processes. Those Functions also introduce two new process states: UNDEFINED and INACTIVE. The new functions and states are expressed in the following state transition diagram together with existing functions and states (fig. 5):

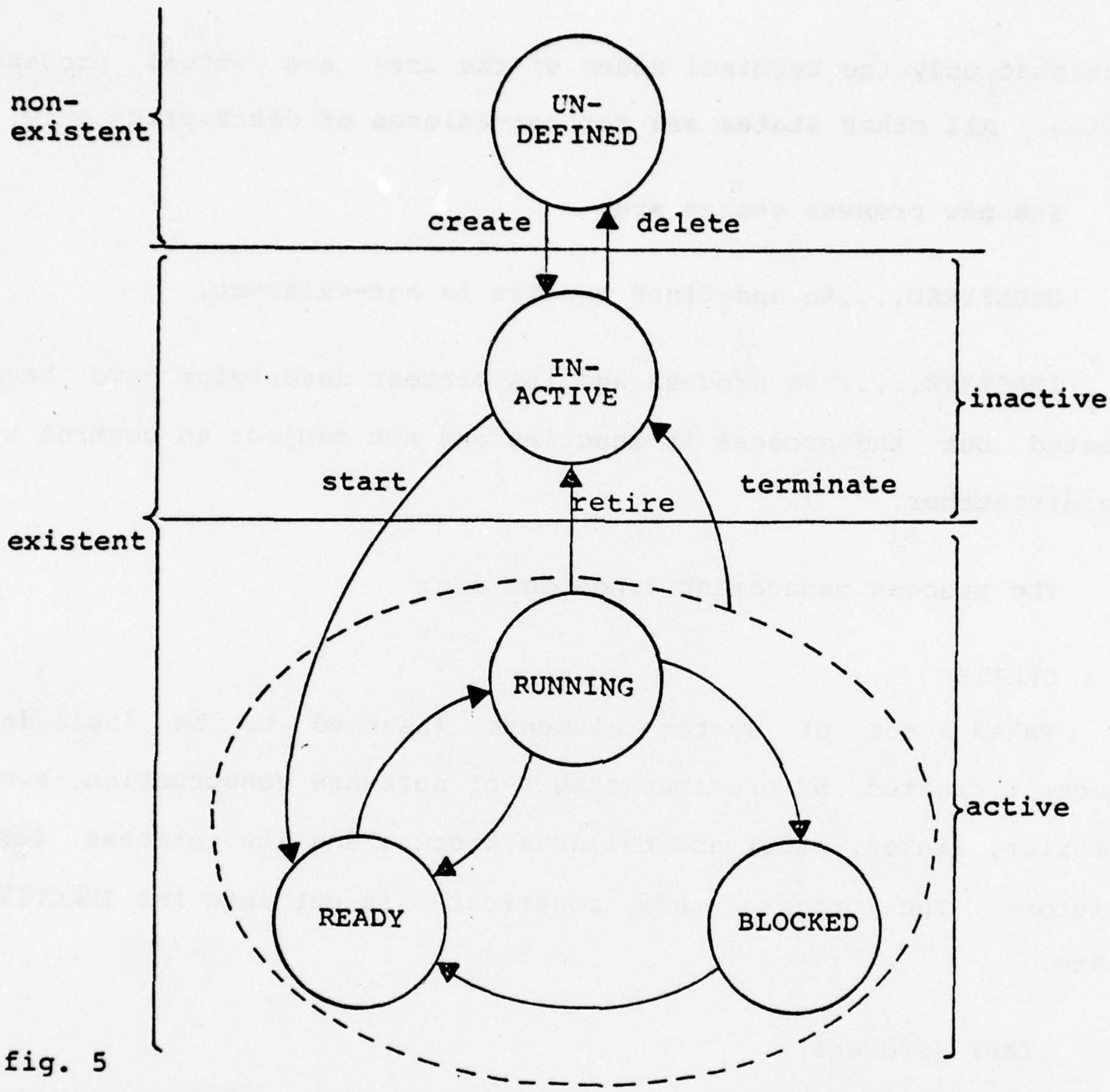


fig. 5

It is useful to indicate a hierarchy of conceptual states in a tree structure (fig 6):

Existent

INACTIVE Active

BLOCKED Runnable

READY RUNNING

FIG. 6

Note that only the terminal nodes of the tree are actual process states. All other states are for convenience of description only.

The new process states are:

UNDEFINED....An undefined process is non-existent.

INACTIVE.....The process and its process descriptor have been created but the process is inactive and not subject to control by the dispatcher.

The process management functions are:

CREATE

Takes a set of system elements (assumed to be 'building blocks'. created by previous stages of software construction, e.g. compiler, linker, etc.) and builds a process and its process descriptor. The process thus constructed is put into the INACTIVE state.

START (process)

Switches the process from the INACTIVE to the READY state with appropriate initialization (e.g. process descriptor, process parameters, etc.). The process thus becomes ACTIVE and RUNNABLE.

RETIRE

The RUNNING process voluntarily retires from further dispatcher influence and is placed in the INACTIVE state.

TERMINATE (process)

The process 'process' is switched from whichever ACTIVE state (RUNNING, READY, BLOCKED) that it is currently in into the INACTIVE state.

DELETE (process)

Removes the process 'process' from the system and releases any resources held by it (e.g. process descriptor, main storage, etc.).

9. SYNCHRONIZATION FUNCTIONS

Synchronization tools are necessary to coordinate processes. The kernel is now suited to implement a more powerful set of synchronization functions in which the physical processors are disconnected from processes going to 'wait'.

Considerations of the fundamental requirements posed by a synchronizing concept result in the following definition of a synchronization model (fig. 7) and two actions performed on it.

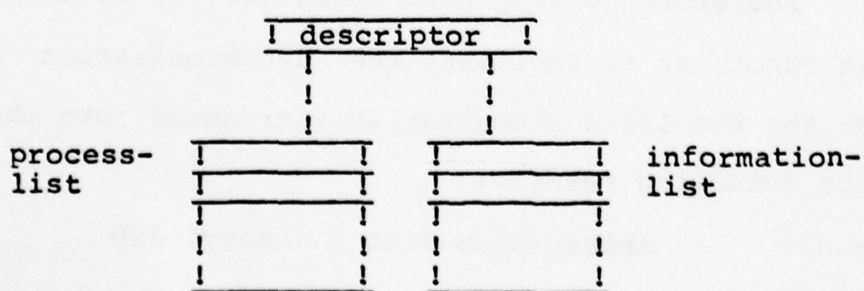


fig. 7

SEND-ACTION (information)

process list = (empty)	insert information into information list
= (not empty)	remove at least one process from process list, deliver information to it and READY it

WAIT-ACTION (information)

information list = (empty)	insert executing process into process list, BLOCK executing process
= (not empty)	remove at least one element from information list, deliver it to executing process

From the definition of these two actions it is obvious that only one of the two lists is present at a time and that both lists have identical elements (process identification and information as minimal set). Therefore we only need space for one list and only one set of list functions to implement the synchronization model. To distinguish the two lists a counter is introduced into the descriptor with the following meening:

counter = 0 : information list = (empty) AND
process list = (empty)

counter > 0 : information list = (not empty) AND
process list = (empty)

counter < 0 : process list = (not empty) AND
information list = (empty)

abs(counter) = number of elements in either list.

These relations assume that the corresponding lists exist. It should be mentioned that all strategy-dependent parts of the synchronization functions are embedded into the list functions.

The counter and the corresponding list form an entity called a SYNCHRONIZATION ELEMENT.

To avoid any confusion with established synchronization concepts, the two functions are now called INC (send- action) and DEC (wait- action), reflecting their operation on the counter.

At least two data elements are accessed by the two functions: The synchronization element itself and the readylist of a processor-pool. Simultaneous access to these elements has to be excluded using the LOCK/ UNLOCK functions. The two functions are described as follows:

INC (synchelement, info)

The counter of the synchronization element 'synchelement' is incremented. If the counter is now less than or equal to zero, at least one process is waiting in the process list. One process is removed, switched to the READY state and the information 'info' is passed to the place formerly defined when the now removed process

executed the corresponding DEC function. The processor- pool of the removed process is (conditionally) NOTIFIED (cf. par. 7). If the counter is greater than zero, no process is waiting and the (i- dentification of the) sending process and the information 'info' are inserted in the information list.

DEC (synchelement, info)

The counter of the synchronization element 'synchelement' is decremented. If the counter is now less than zero, no information is available. The process executing the function and a pointer to 'info' (the place where the information will have to be put) is in- serted into the process list and this process is put in the BLOCKED state. The executing processor becomes free and executes the AS- SIGN function.

If the counter is equal to or greater than zero, the necessary information is removed from the information list and passed to the return parameter 'info'.

10. REALIZATION OF SOME HIGHER LEVEL SYNCHRONIZATION CONCEPTS

Higher level synchronization functions can be realized using INC and DEC. Usually, the interface to the higher level synchronization tools constructed in this layer is built by SVC (supervisor call) or TRAP instructions.

The following examples of some known synchronizing concepts illustrate the method.

10.1 SEMAPHORE

The semaphore concept introduced by E.W. Dijkstra can be realized easily.

For each semaphore one synchelement sys_sema must be initialized. (Initial value of sys_sema.counter >= 0)

Implementation of the two operations on semaphores:

```
V(sema) = INC (sys_sema,NIL);
P(sema) = DEC (sys_sema,NIL);
```

The use of NIL implies that the information-queue does not exist and all operations which are performed on it within INC and DEC may be omitted (to speed up operation).

10.2 MESSAGE

For each process one synchelement sym_proc must exist (creation static or dynamic).

Buffer allocation under process control or RTOS control for

internal use of messages.

```
SENDM(proc,message) = INC(sym_proc,message);
WAITM(message)      = DEC(sym_actproc,message);
```

10.3 MONITOR

Monitors are realized based on the definition of C.A.R. Hoare.

A monitor is a collection of associated data and procedures working on this data. Processes may at any time attempt to call such a monitor procedure; however only one process at a time succeeds in entering it. Signal and wait operations on condition variables are provided within the monitor to delay a process. When a process signals a condition it must wait until the resumed process (if there is one) permits it to proceed.

For each monitor the following synchelements are necessary:

symon_monid - to realize exclusive entry into the monitor

syurgent_monid - to notify which signalling processes are waiting

sycond_cvar - one for each condition variable

monid = identifier for monitor

cvar = identifier for condition variable

Translation of monitor syntax into supervisor calls of synchronization functions can be expressed as follows:

```
                          ENTER (monid);
monid.procedurename -> procedurename;
                          EXIT (monid);

cvar.signal         -> SIGNAL (cvar,monid);
cvar.wait           -> WAIT (cvar,monid);
```

Implementation of these synchronization functions by the elementary synchronization functions INC and DEC:

```
ENTER (monid)        = DEC (symon_monid,NIL);
EXIT (monid)         = IF syurgent_monid.counter < 0
                       THEN INC (syurgent_monid,NIL)
                       ELSE INC (symon_monid,NIL);
WAIT (cvar,monid)    = EXIT (monid);
                       DEC (sycond_cvar,NIL);
SIGNAL (cvar,monid) = IF sycond_cvar.conter < 0 THEN
                       BEGIN INC (sycond_cvar,NIL);
                             DEC (syurgent_monid,NIL);
                       END;
```

If every SIGNAL occurs as the last statement of its monitor procedure, the synchelement syurgent_monid can be omitted together with all operations on it.

```
ENTER (monid)        = DEC (symon_monid,NIL);
EXIT (monid)         = INC (symon_monid,NIL);
WAIT (cvar,monid)    = INC (symon_monid,NIL);
                       DEC (sycond_cvar,NIL);
SIEXIT (cvar,monid)  = IF sycond_cvar.conter < 0
                       THEN INC (sycond_cvar,NIL)
                       ELSE INC (symon_monid,NIL);
```

More complex monitors may be implemented if WAIT and SIGNAL are replaced by message functions.

11. INPUT / OUTPUT

Input/Output is defined to be the movement of data into or out of the system and can be viewed as an extension of inter-process communication.

Input/Output processing is considered to consist of two cooperating parallel processes, one process running in a general purpose processor and the other process running in a conceptually separate I/O processor. Depending upon the hardware configuration, the I/O process may be executed on a seperate physical processor or alternatively, the logic of the I/O process may actually be executed by a general purpose processor.

The configuration of two physically separate processors is represented in fig. 8

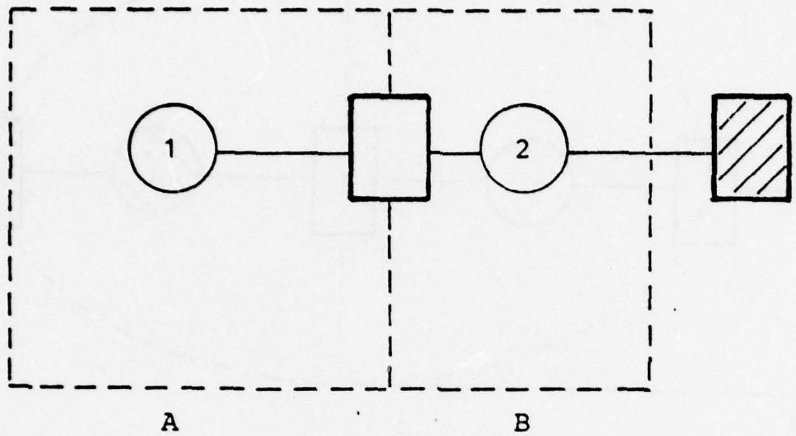
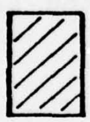


fig. 8

where  denotes hardware source/sink

In this figure process 2 is the I/O process running on the physically separate I/O processor B.

The configuration of two conceptually separate processors, realized by only one physical processor, is represented in fig. 9.

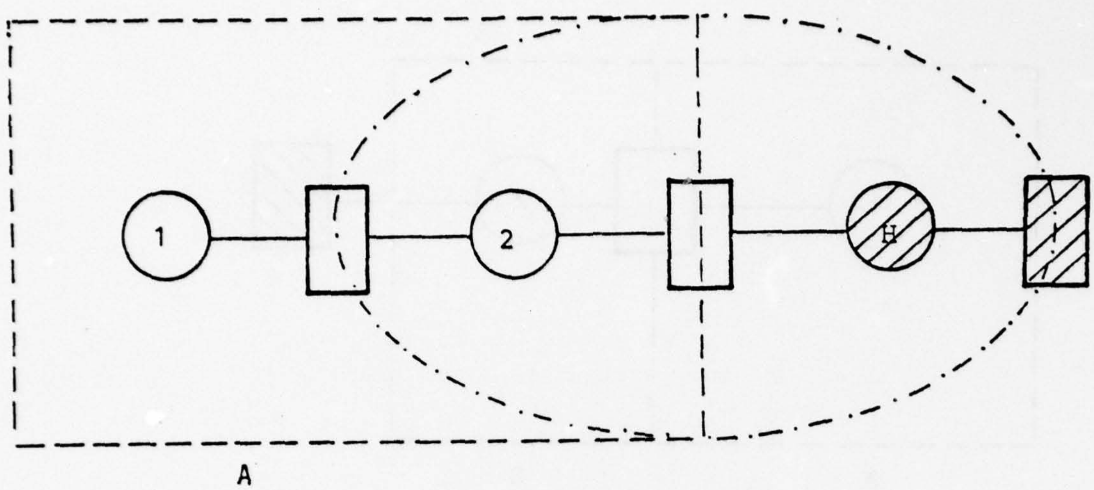


fig. 9

 denotes the hardware logic which is conceptually a process communicating between hardware source/sink and the I/O port of the processor A.

In this figure the conceptual I/O processor is represented by the dash-dot line. Two cooperating processes run on this conceptual processor: Process 2 - a software I/O process actually running on the physical processor A and process H - a hardware process.

Note that process 2 is not scheduled by the dispatcher but is scheduled by the hardware interrupt which thus provides an alternative and more primitive method of processor multiplexing.

A more conventional view of this configuration is shown in fig. 10.

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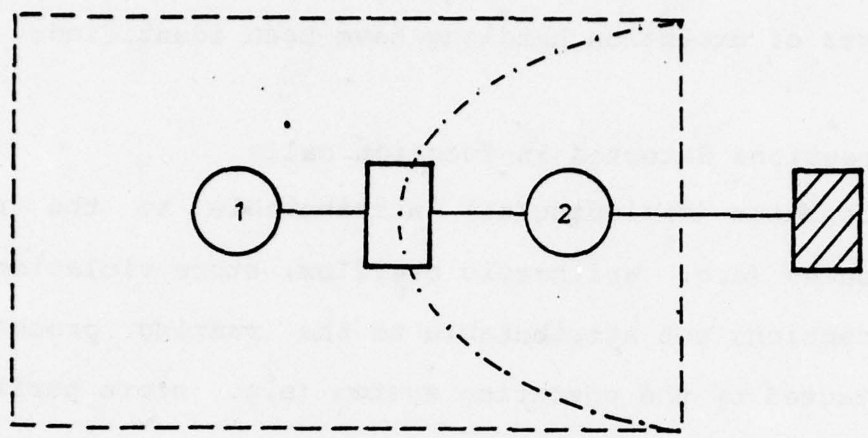

fig. 10

The hardware source/sink now includes the hardware process H and the I/O communication port of the processor A.

12. EXCEPTION HANDLING

Four types of exception handling have been identified:

(a) exceptions detected in function calls

(b) exceptions (excluding(a)) attributable to the running process (e.g. arithmetic overflow, store violation)

(c) exceptions not attributable to the running process and detected by the operating system (e.g. store parity failure)

(d) exceptions detected by one process and attributable to another process

Type (a) exceptions are best handled by a return parameter of each function.

Type (b) exceptions can optionally be handled by a user defined routine.

Type (c) exceptions must be handled by the operating system.

Note that exceptions of type (b) and (c) occur synchronously as a direct result of executing a processor instruction.

Type (d) exceptions are the responsibility of the application system and are not to be handled by the operating system.

It is not appropriate to state the action to be taken upon the occurrence of an exception as part of a set of guidelines or stan-

dards. However, the guidelines should include some mechanism by which the exceptions may interface with the process above the kernel.

One internal function is introduced to support the handling of type (b) and (c) exceptions:

EXCEPTION_RECEIPT

The function receives the exception upon its ocurrence. It must determine whether the exception is of type (b) or (c). If it is of type (b) and a user defined routine has been specified, control is transferred to that routine after appropriate manipulation of process descriptor, stack(s) etc. For type (b) and (c), when no user defined routine has been specified, control is transferred to an operating system exception handling process.

To enable the process to control the setting of the exception handling routine two functions are introduced:

EXCEPTION_ON (address of user defined routine)

sets the exception handling routine for type (b) exceptions to a user defined routine identified in the parameter.

EXCEPTION_OFF

sets the exception handling routine for type (b) exceptions to the default option provided by the operating system.

One important decision has to be taken by a user defined exception handling routine, that is to decide whether the process can

continue or whether it must be stopped. In the latter case the process management function RETIRE will be called. For the former case the following function is introduced:

EXCEPTION_RETURN

Returns control back to the operating system to enable it to do any necessary manipulations of process descriptor, stacks, etc. before returning control to the exception producing process.

13. DEFINITION OF AN OPERATING SYSTEM KERNEL

According to the model presented in fig. 2 the proposed operating system functions and their hierarchical relations are shown in fig. 11

The first three levels of the system can be regarded as a KERNEL system. Two types of entries to that kernel can be distinguished:

synchronous or procedure-like entries (called by a process):

INC, DEC, NOTIFY
EXCEPTION_ON, EXCEPTION_OFF

asynchronous or interrupt-like entries:

REDISPATCH
EXCEPTION_RECEIPT

NOTES:

- "EXCEPTION HANDLING" on level 2 represents some necessary, but not yet defined functions to handle exceptions;
- the process management functions will also need additional functions within the kernel and are not included in the figure;
- other functions to access kernel data, to reorder lists, etc., will have to be included in the kernel;
- the various relations of the LOCK and UNLOCK functions are not explicitly shown in the figure.

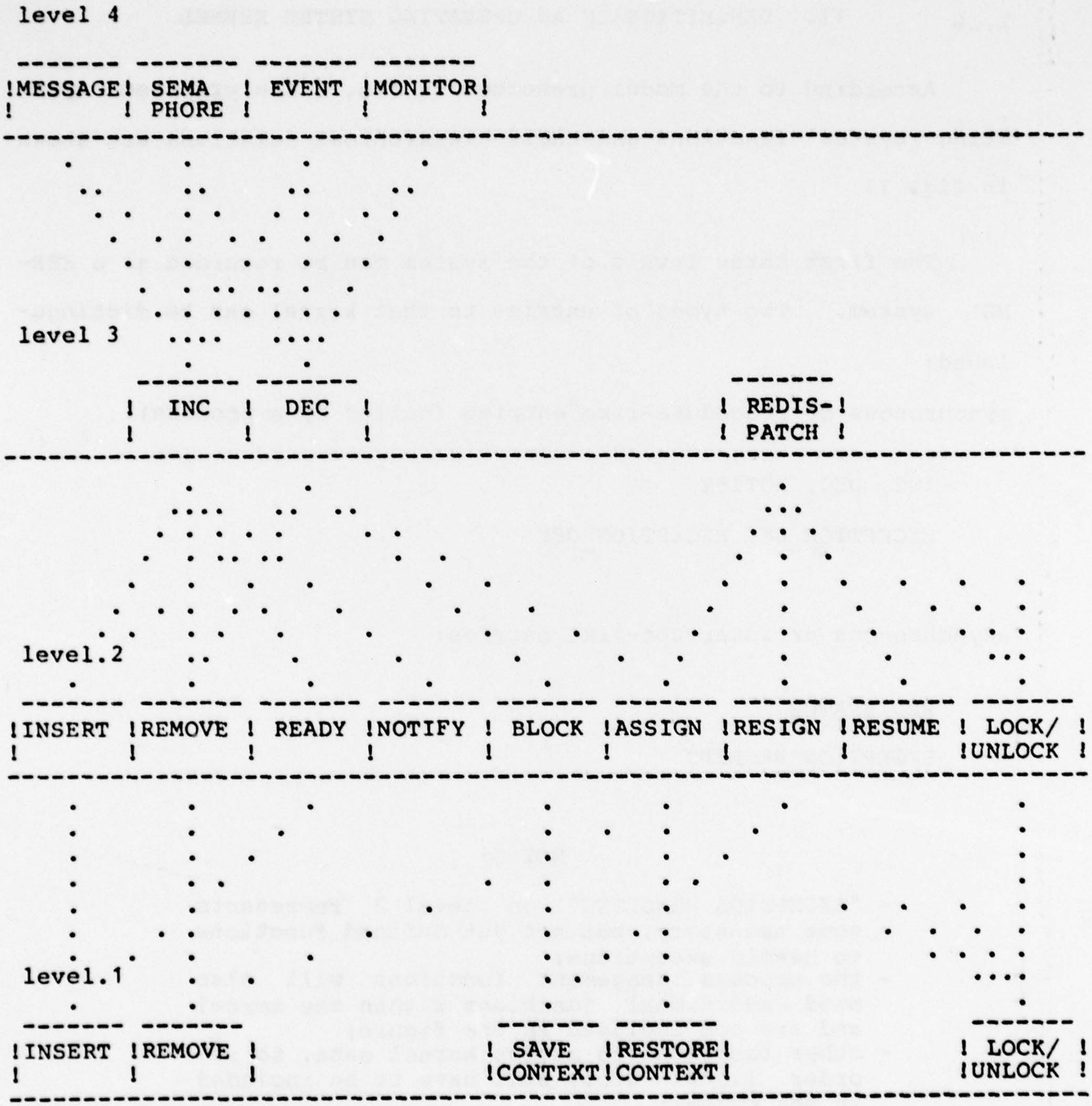
level 4
MESSAGE
SEMA PHORE
EVENT
MONITOR
level 3
INC
DEC
REDIS- PATCH
level.2
INSERT
REMOVE
READY
NOTIFY
BLOCK
ASSIGN
RESIGN
RESUME
LOCK/ UNLOCK
level.1
INSERT
REMOVE
SAVE CONTEXT
RESTORE CONTEXT
LOCK/ UNLOCK

fig 11a

```
     level 3

                 ------- ------- -------
                !EXCEPT.!EXCEPT.!EXCEPT.!
                !RECEIPT!  ON   !  OFF  !
     -----------------------------------------
                 .      .      .
                  .     .     .
                   .    .    .
                    .   .   .
                     .  .  .
                      . . .
                       ...
     level 2            ...
                         .
                        ------- -------
                       !EXCEPT.!EXCEPT.!
                       !HANDL. !RETURN !
     -----------------------------------------
```

fig. 11b

14. FUTURE WORK

Chapters 1 to 13 report the currently agreed specifications for the design of the operating system. The objectives of TC 8 for the next year are to complete the kernel and to continue work on higher levels of construction.

Outstanding work on the kernel includes the following:

- the process management and exception handling functions have to be fully specified.
- kernel data management - this covers all the imbedded strategies including the ordering and reordering of lists etc. It also includes strategies for selective lock-outs on data areas which avoid deadly embrace situations.
- system configuration and reconfiguration - both in response to manual requests and as a consequence of exception recovery.

Among the topics to be tackled in the layers above the kernel are:

- resource allocation
- store management

It is likely that this program of work will have repercussions on existing specifications and therefore a further iteration of these can be expected.

NOTATION OF THE OPERATING SYSTEM FUNCTIONS

This appendix shows in a more detailed notation the construction of the described operating system functions. As opposed to the general descriptions in the report, the detailed notations may contain implementation dependent parts.

A PASCAL-like notation and/or flowcharts are used to describe the functions. The numbering of the paragraphs corresponds to the first part of the report.

Comments on the PASCAL-like notation:
Not all data elements used are described completely; the data descriptors are such that the functions described are understood without unnecessarily prescribing a specific implementation.

Comments on the flowcharts:

The following graphical elements are used:

```
 ________
(________)
    !
```
synchronous entry

```
    !
 ________
(________)
```
synchronous exit

```
_________________
!               !
```
operation(s)

```
 ________
<________>
```
conditional branches

```
----
   /
  ---->( ________ )
         ________
            !
```
asynchronous entry

```
     !
 ________
(________)----
                /
                ---->
```
asynchronous exit

A.4. Basic Synchronization

```
                    ( LOCK )      parameter: v
                       !
                       !---------<------------
                       !                     !
             ! inhibit interrupts !          !
             !  (*selectively*)   !          !
                       !                     !
                       !          no         !
indivisible (   < v=unlocked  >-->--! enable interrupts !
operation   (   ! v:=locked !       !  (*selectively*)  !
                       !
                       !
                     (   )


                   ( UNLOCK )      parameter: v
                       !
                       !
               ! v:=unlocked !
                       !
                       !
            ! enable interrupts !
            !  (*selectively*)  !
                       !
                       !
                     (   )
```

Pascal notation:

```
TYPE protection = (locked,unlocked);

PROCEDURE LOCK (VAR v: protection);
   BEGIN inhibit
      WHILE v = locked DO
         BEGIN
         enable; inhibit
         END;
      v:=locked
   END;


PROCEDURE UNLOCK (VAR v: protection);
   BEGIN
      v:=unlocked
      enable
   END;
```

```
where   enable  - procedure to enable  interrupts
        inhibit - procedure to inhibit interrupts
```

A.6. Process- and Processor States

```
                      ( ASSIGN  )
                           !
                           !- - - - -<- - - - -
                           !            no    !
           < READY process exists  >->-! wait  !
                           !
                           !
         !     LOCK (lockvariable of pool)       !
         ! (*pool of the executing processor*)   !
                           !
                           !
        !      REMOVE (newproc, readylist)          !
        ! (*readylist of executing processor*)      !
                           !
                           !
           !   state of newproc:= RUNNING      !
           ! state of processor:= ALLOCATED    !
           !     actual process:=newproc       !
                           !
                           !
             ! RESTORE CONTEXT (newproc) !
                           !
                           !
            ! UNLOCK (lockvariable of pool) !
                           !
                           !
                        (     )
```

```
                 ( RESIGN )
                     !
                     !
      ! SAVE CONTEXT (actual process) !
                     !
                     !
   !       LOCK (lockvariable of pool)        !
   ! (*pool of the executing processor*)      !
                     !
                     !
!        INSERT (actual process,readylist)       !
!         state of actual process:=READY         !
! state of executing processor:=DEALLOCATED      !
!              actual process:=NIL               !
                     !
                     !
      ! UNLOCK (lockvariable of pool) !
                     !
                     !
                  (      )


                 ( BLOCK )
                     !
                     !
!        SAVE CONTEXT (actual process)            !
! (*actual process of executing processor*)       !
                     !
                     !
!        state of actual process:=BLOCKED         !
! state of executing processor:=DEALLOCATED       !
!              actual process:=NIL                !
                     !
                     !
                 (        )


                 ( RESUME )
                     !
                     !
   ! executing processor := ALLOCATED !
                     !
                     !
                 (        )
```

```
                        ( READY )                parameter: process
                            !
                            !
  ------------------------------------------------------------
  !             LOCK (lockvariable of pool)                  !
  !   (*pool of processors identified in the des-            !
  !   criptor of 'process', not necessarily ident-           !
  ! ical with the pool of the executing processor*)          !
  ------------------------------------------------------------
                            !
                            !
              -------------------------------
              !  INSERT (process,readylist)  !
              !  (*readylist of that pool*)  !
              -------------------------------
                            !
                            !
                ---------------------------
                ! state of process:=READY !
                ---------------------------
                            !
                            !
             -----------------------------------
             ! UNLOCK (lockvariable of pool)   !
             -----------------------------------
                            !
                            !
                       (         )
```

```
                        ( NOTIFY )      parameter: pool
                            !
                            !
  no   .-< DEALLOCATED processor in pool available >-.   yes
       !                                              !
       !                                              !
---------------------------                 ---------------------------
! select a processor, whose !               ! select a DEALLOCATED     !
! 'actual process' has      !               ! processor                !
! lowest priority           !               !                          !
---------------------------                 ---------------------------
       !                                              !
       ------------------------------------------------
                            !
                            !
  ----------------------------------------------------------
  ! send stimulus (*interrupt*) to this processor          !
  !        state of this processor:=NOTIFIED               !
  ----------------------------------------------------------
                            !
                            !
                       (         )
```

A.7. Preemption and Processor Redispatching

```
                ----
                  /
                   ---->( REDISPATCH  )
                              !                               no
       < state of executing processor=NOTIFIED >-->-
                              !                                   !
                              !yes                                !
                no            !                  yes              !
              -<--< switch processes  >-->-                       !
               !                                   !              !
               !                                   !              !
       ! RESUME  !                       ! RESIGN  !              !
               !                                   !              !
               !                                   !-----<---
               !                                   !
               !                         ! ASSIGN  !
               !                                   !
              ------->------------<-------
                              !
                              !
                          (        )----
                                        /
                                         ---->
```

PROCEDURE REDISPATCH;

BEGIN

IF processor.state=notified

THEN IF preempt (*conditions to redispatch processor are true*)

THEN BEGIN resign;

assign

END

ELSE resume

ELSE assign

end

simplified version (c.f. par. 7, note 1):

```
         ----
            /
            ---->( REDISPATCH  )
                        !
                        !                       no
   < state of executing processor=NOTIFIED >-->-
                        !                         !
                        !yes                      !
                        !                         !
                  ! RESIGN  !                     !
                        !                         !
                        !--------------------------
                        !
                  ! ASSIGN  !
                        !
                        !
                     (      )----
                                 /
                                 ---->
```

PROCEDURE REDISPATCH;

BEGIN

IF processor.state=notified THEN resign;

assign

end

A. 9. SYNCHRONIZATION PRIMITIVES

Definition of data types used by the synchronization functions:

```
TYPE synchelement = RECORD
                    counter : integer;
                    pil     : list (* OF listelement *)
                    END;

TYPE listelement  = RECORD
                    proc    : processid;
                    info    : buffer
                    END;

TYPE list         = definition of an arbitrary list structure;

TYPE buffer       = definition of an arbitrary buffer or a
                    pointer to an arbitrary buffer;

TYPE processid    = RECORD
                    pool    : processorid;
                    (* other information *)
                    END;
TYPE processorid  = reference to processor pool descriptor;

VAR actproc : processid; (* identification of the running pro-
                            cess exists for each processor *)
```

Definition of elementary synchronization functions INC and DEC:

```
PROCEDURE INC (VAR syname : synchelement;
               VAR info   : buffer);
   VAR listel : listelement;
   BEGIN syname.counter := syname.counter + 1
      IF syname.counter <= 0 (* test for waiting process *)
      THEN BEGIN
           remove (listel,syname.pil); (* remove waiting process *)
           listel.info∧ := info; (* pass address of info to address
                                    specified by removed process *)
           ready (listel.proc);  (* ready the waiting process *)
           notify (listel.proc.pool); (* notify the corresponding
                                    processor-pool *)
           END
      ELSE insert ((actproc,info), syname.pil) (* no process
                                    waiting, insert the process
                                    executing the INC plus the
                                    address of the send info *)
END;
```

```
PROCEDURE DEC (VAR syname : synchelement,
               VAR info   : buffer);
VAR listel : listelement
BEGIN syname.counter := syname.counter - 1 (* decrement counter *)
  IF   syname.counter < 0   (* check if information available *)
  THEN BEGIN
     insert ((actproc,∧info),syname.pil); (* no info avai-
              lable, insert the process executing DEC plus the
              address of the info to be sent *)
     block;  (* block executing process *)
     assign; (* assign new process to processor *)
     END
  ELSE BEGIN
     remove (listel,syname.pil); (* info is available in the list *)
     info := listel.info∧; (* pass address of info to result
                              parameter *)
     END
END
```

PAPER LIST

CATEGORIES

I.....Up to Date Report

II....Working Papers

III...TC 8 Reference Papers (obtainable from TC 8)

IV....General Reference Papers

NUMBERING OF THE PAPERS

- category
- number within the category
- version of the paper (optional). Higher version number automatically replaces previous papers.

PAPER LIST

I-1-5..........TC 8
REPORT
October 1977

II-1-1.........Juergen Nehmer
On a Precise Operating System Terminology
July 1975

II-2-1.........Juergen Nehmer
Comparison of three Synchronizing Concepts
December 1975

II-3-1.........Gerhard Schrott
Common Elementary Synchronization Functions for an Operating System Kernel
January 1976

II-4-1.........Thierry Lalive d'Epinay
Notes to the Multiprocessor Concept
March 1976

II-5-1.........Tony Mark
On Completion of the Kernel
September 1976

II-6-1.........Drago Vojnovic
Monitor Synchronization Concept for I/O Processing

II-7-1.........Tony Mark
Exception Handling
January 1977

II-8-1.........Thierry Lalive d'Epinay
Implementation of an Operating System Kernel
June 1977

II-9-1.........Ivan Bach
On the Scheduling Problem in Real Time Operating Systems
September 1977

II-10-1........Jiri Hoppe and Thierry Lalive d'Epinay
Synchronization between Processes Running on Processors Without Common Memory

II-11-2........Gerhard Schrott
Additional Functions to the Operating System Kernel

III-1..........Thierry Lalive d'Epinay
Software-Organization for Process-Computers
June 1974

III-2..........Juergen Nehmer
Dispatcher Primitives for the Construction of Operating System Kernels
Acta Informatica 5, 237-255 (1975)

III-3..........H.G. Mendelbaum
For a Structuration Methology in Control Software Design
July 1974

III-4..........W. Kaiser
Overview on the Operating Systems Telemequanique RTDMS - DEC RT 11

JANUARY 1975

III-5..........VDI/VDE - GMR 4.2
Process Control Computer Operating Systems
June 1975

III-6..........Juergen Nehmer
Synchronizing Concepts and their Implementation by a Hierarchy of Elementary Operating System Functions

III-7..........Thierry Lalive d'Epinay
A New Method of Constructing and Using Real-Time Operating Systems
September 1975

III-8..........Gerhard Schrott
Definition and Construction of Real-Time Operating Systems by Basic Functions

III-9..........Ken Jackson et al
Mascot - A Modular Approach to Software Construction and Test
September 1975

III-10.........Ken Jackson
Modularity in Real-Time Computer Systems
August 1976

III-11.........Thierry Lalive d'Epinay
The Virtual Computer System
September 1976

III-12.........Ken Jackson
Language Design for Modular Software Construction
December 1976

III-13.........Tony Mark and Juergen Nehmer
High Level Interrupt Processing via Semaphores
September 1976

III-14-2.......Jiri Hoppe
Some Remarks Concerning I/O
March 1977

III-15.........TC 8
Comments on LTPL-Tasking Paper
March 1977

III-16.........T. Mark, O. Eggenberger, J. Nehmer
Experiences in the Implementation of a Structured Real-Time Operating System
1977

III-17.........J.J. Simon
Parallel Processing and High Order Languages
August 1977

III-18.........Drago Vojnovic
Kernel Real Time Systems
August 1977

IV-1...........Juergen Nehmer
Dispatcher Elementarfunktionen fuer symmetrische Mehrprozessor - DV-Systeme
September 1973

IV-2...........Juergen Nehmer
Ein Ansatz zur Standardisierung von Betriebssoftware
1973

IV-3...........N.G. Gammage
Virtual Processors for Real-Time Applications
April 1974

IV-4...........K.H. Timmesfeld
Joint Tasking Proposals for a LTPL
December 1975

CHAPTER X

REPORTS OF THE AD-HOC COMMITTEE ON MICROPROCESSORS/MICROCOMPUTERS

The following documents are included here.

1. Letter of Mr. Koji Yada re., Microcomputer Working Group of IPW-J.
2. "Description of Japan Microcomputer Club," by Mr. Koji Yada.
3. "Technical Trends in Computing Instrumentation," by Mr. Koji Yada.
4. "Microprocessors in Japan," by Jyoichi Mori, Hiroaki Tajima, Morihiko Tajima, and Yoshifuni Okada.
5. Volumes 1 and 2 of <u>Micro Computer News</u>.

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TELEPHONE: 0424 (61) 2141

Prof. Theodore J. Williams
Purdue Laboratory for
A pplied Industrial Control
102 Michael Golden
Purdue University
West Lafayette, Indiana 47907
U.S.A.

November 25, 1977

Microcomputer Working Group IPW-J was established on November, 1977. We had the first meeting of this group on November 18. Then, it was decided that we have about one meeting per a month. You can see the theme of this meeting in Appendix 1. Next meeting is to be held in January, 1978 on the theme shown in Appendix 2. You will have a report of this meeting later.

In Japan, there are several Microcomputer Committees. I will introduce some of them. Microcomputer Committee of JEIDA makes surveys of microcomputers, especially, it investigates State-of-the-art of foreign microcomputers, or investigates of marketing.
Microcomputer Committee of NOMA has discussions about the impact of microcomputer technology on the society, and makes several reserches on Delphi method. I am a member of this group.
You can see Japan Microcomputer Club in another sheet. I am an organizer of this club. We issue a publication "Microcomputer News".

PRECEDING PAGE BLANK

And also Computing Instrumentation Committee makes a survey of microcomputers. Especially it investigates applications of microcomputers for Smart Instruments, or Laboratory Automation. Enclosed please find a copy of the outline. Also enclosed are pamphlets that introduce Japanese microcomputers we have developed.

Sincerely yours,

Koji Yada

Koji Yada
Computer Center

CC: Dr. Williams (Purdue University)
Mr. Yoel Keiles (Honeywell)
All Microcomputer Committee Members

November 18, 1977

Appendix 1

Microcomputer Working Paper

Koji Yada
Microcomputer Working Group
IPW-J

Group 1

° Microcomputer Development Technology

° Debugging Tools

Group 2

° Limits of High Level Language for Microcomputer

° Software for Microcomputer Control Systems

Group 3

° Benchmark
  - Evaluation for Performance
  - Standardization for Software Tools

° Riliability and Environment of Microcomputer for Industrial Control Systems

° Concepts of Microcomputer

Group 4

° Multi-Microcomputer
  - Communications between processors
  - Protocol
  - Distributed Systems

° Standard Bus

Group 5

° Functional Requirements for Microcomputer Control Systems

° Cost Benefit on Microcomputer Application Systems

° Limits of Microcomputer Application

° Developments and its Tools on Bit Slice Microcomputers

Group 6

° Evaluation on Microcomputer based Products

Appendix 2

Preliminary Working Paper for 2ND Microcomputer Meeting (Jan. 11, 1978)

Koji Yada
Microcomputer Working Group
IPW-J

1. Microcomputer Development Technology

° MDS

° PL/M

° Emulator

° Cross and Self Software

° Second Source

° *Interface Changer*

° Productivities of Software

° Problems on Various Microprocessors

° Development Tools and Production Tools for Microcomputer Based Products

° Documentation for Microcomputer Systems

2. Debugging Tools

° Logic Analyzer

° Micro Analyzer

° Console

° Portable Maintenance

° Software Debugger

° Simulator for real time systems

Japan Microcomputer Club

Koji Yada
Electrotechnical Lab.
5-4-1, Mukodai, Tanashi,
Tokyo, Japan

The ordinary people in their daily life had very few contacts with the large-scale conventional computers before microcomputers appeared. Microcomputers changed this situation. Because microcomputers have two advantages which the large-scale computers do not have: handiness and low price. This change is due to the development of central processing unit which is included in a microcomputer. Anyone, regardless of age, can not only buy a microcomputer, but also can develop creativity through building and using microcomputers.

Accompanied with the development of microcomputer, the need of such an opportunity has been increasing where many Japanese can begin studing microcomputer, and Japan Microcomputer Club was established on 1st of December, 1976, and received a lot of approval.

Japan Microcomputer Club now has a membership of about 1,200. Microcomputer News are printed bimonthly in English and they are sent to U.S. Microcomputer Symposiums are held on every Saturday. There are 40 to 110 members attend every symposium. It is held not only for the members but also who attends the symposium. Japan Microcomputer Club includes several committees; Editorial Committee make 'Microcomputer" magazine. This magazine has been an organ of Japan Microcomputer Club, but now it is expected to extend its service by making an organ to a microcomputer technical magazine which includes articles of assembling microcomputers.
Reserch and Investigation Committee plans to hold regular seminars, special seminars, and exhibition of member's works approximately 30 - 40 times a year. Microcomputer Standardization Committee holds technical investigation of Audio cassette standard, making reference to Kansas City standard. It is expected to be of service to members for exchanging microcomputer programs and data. Microphotogram Library Committee purposes to facilitate exchanges of programs. Microcomputer Contest Committee already held an exhibition of computer works and contest. It helped to participate in 'Business Show' and 'Microcomputer Shos'.

Microcomputer Engineer Examination Committee purposes to examine microcomputer engineers and technicians in basic techniques and knowledge.
Microcomputer Organization Committee is established as a branch of Japan Microcomputer Club, in order to promote communications among the local members.
Microcomputer Planning Committee plans an inspection trips to universities and manufacturers,and exhibitions and overseas investigation group trip are planned.
Also, there is a Microcomputer Laboratory which offers a place for exhibitions of original works, and for work shops to members of the club.
So far, several microcomputer research seminars have been held. They are divided into microcomputer regular seminars, special seminars and presentation of microcomputer researches. 'Microcomputer Circular' magazine is used as a source material for microcomputer research seminars.

I hope for development of microcomputer technique in Japan in future and it will make Japan's microcomputer technique firm and well established.

Oct. 1, 1977

Technical Trends of Computing Instrumentation

Koji Yada
Electrotechnical Laboratory
5-4-1, Mukodai, Tanashi, Tokyo, Japan

1 Introduction

Today, various kinds of computers such as micro, mini, and large scale have been occupying the important parts in instrumentation systems; e.g. computer supervision, automation, and rationalization have took the place of time consuming measurement by man power. Consequently, scientists and engineers can have much time for their creative works.
One of the advantages that a computer has but a man does not is its reliability for continuously repeated tasks, which enables adjustment and measurement of the instruments to be executed in fixed order and in high quality. The most important feature of the instrumentation system using a computer is its flexibility required to modify and to exchange the components frequently aiming a better system construction.

It was natural in such circumstances that the Computer Instrumentation Committee (with Professor O. Nishino of Kogakuin University in the chair) started its activity of investigating instrumentation using computers; e.g. definition of the concept, movements for standardization, new sensors and component computers, program languages, and software systems and networks. Computing Instrumentation Committee has three subcommittees, which are CAMAC Committee (Chairman; Professor I. Miura of University of Tsukuba), Phisico - Chemical Instrumentation Committee (Chairman; Dr. N. Ogita of Physical and Chemical Research Institute), and Applied Instrumentation Committee (Chairman, Dr. K. Sakurai of Radio Electronics Division, Electrotechnical Laboratory) (Fig. 1).

We will cover the general technical trends of computing instrumentation through the activities of those subcommittees.

One of the major goals of computing instrumentaion is standardization; i.e. to establish the common software which enables the experimental and measuring instruments to be connected directly with any computer. These efforts for standardization have been made especially in the field of software and interface. IEC, CAMAC, and ISO have contributed to standardization of real-time languages.

(1) CAMAC Committee

* Connection with United States and Europe
* Consolidation of CAMAC materials
* Publication of CAMAC newsletters
* Investigation into micro CAMAC (intelligent CAMAC)
* Investigation into real - time BASIC

(2) Physical and Chemical Instrumentation Committee

* Investigation into LA technology
* Investigation into precise instrumentation technology
* Investigation into Smart measuring instruments
* Investigation into measurement-purpose interfaces
* Investigation into measurement-purpose softwares

(3) Applied Instrumentation Committee

* Investigation into public utility-instrumentation system (electricity, gas, and water)
* Investigation into environmental instrumentation system
* Investigation into traffic instrumentation system
* Investigation into instrumentation against disasters
* Investigation into medical instrumentation
* Investigation into atomic energy instrumentaion

Fig. 1 Computing Instrumentation Subcommittees

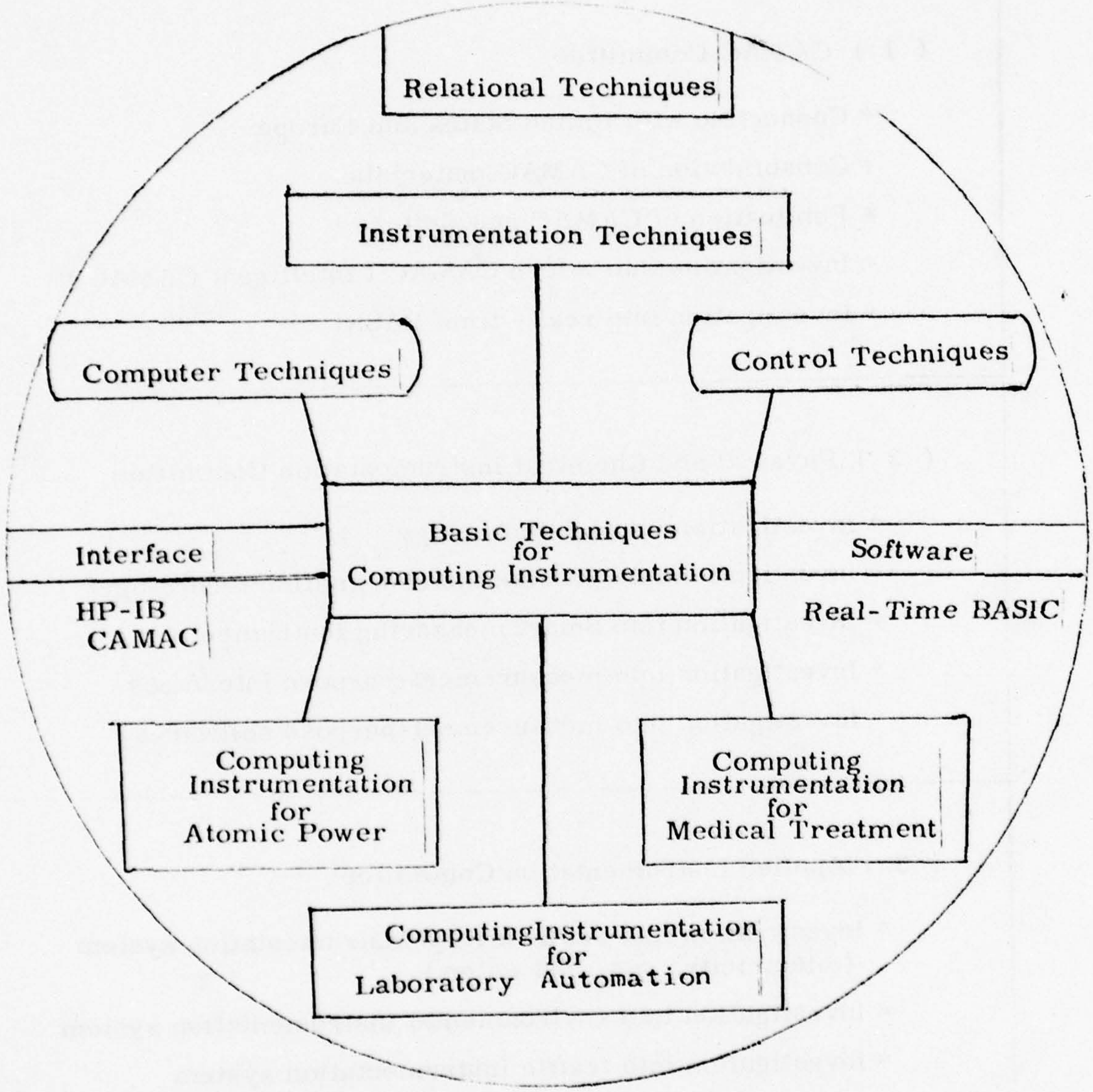


Fig. 2 Concept of Computing Instrumentation

2 Computers for computing instrumentation

(1) Basic feature

The basic feature of the computer required for computing instrumentation is capability to monitor and control the measuring instruments in real-time environment; i.e. facility of a real-time program that enables a computer which is connected on-line with measuring instruments to collect data as results of experiments from sensors and analyze the data to generate control singals.

(2) Types

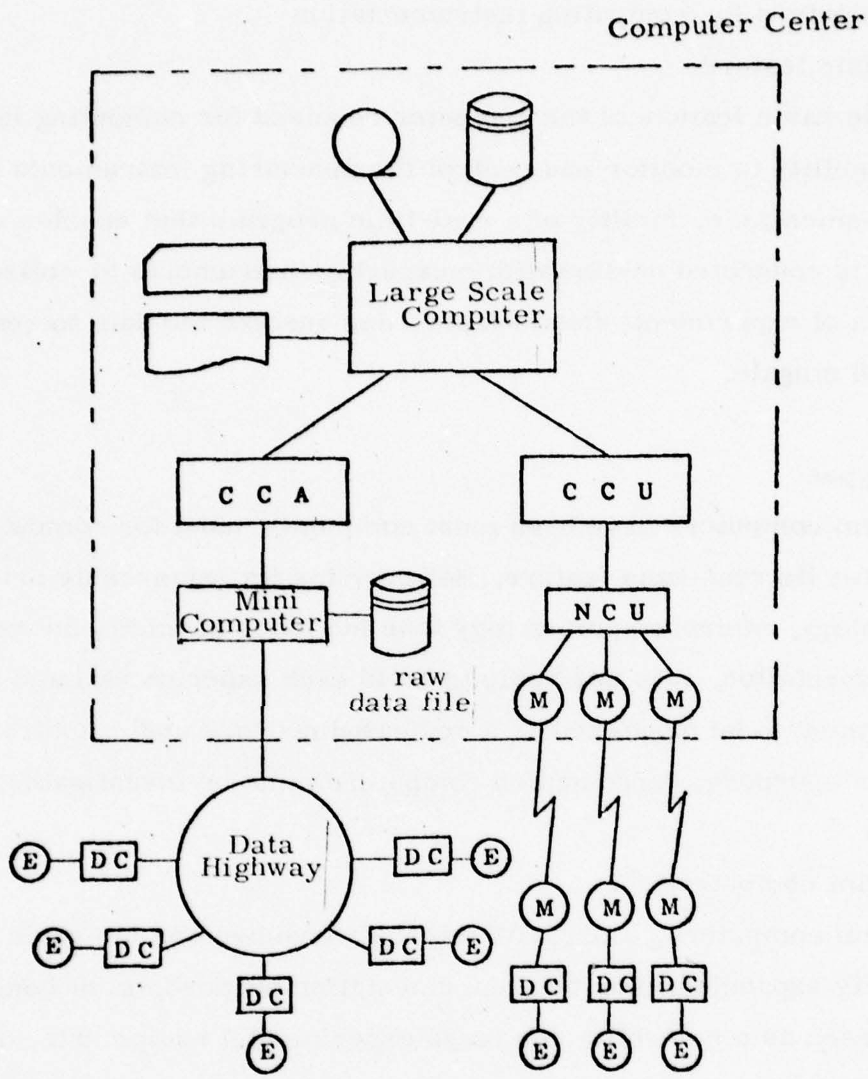
Mini computers have been most commonly used for computing instrumentation for its real-time feature. However for its remarkable development in technology, microcomputers may take the place of minis, In computing instrumentation, it is desirable to build each experimental and measuring instrument to be organized as a dedicated network under control of a computer. For this purpose, large scaled computers must be investigated.

(3) Mini computers

Mini computers, along with micros, have been on the rapid way of the capacity expansion. For the instrumentation purpose, mini computer tends to be used as a controller for large experimental equipments, or as a switching computer for communication control. One of the mini's features is its excellency in cost performance in comparison with large scale computers, which enables to build a computer system as a feature's unit according to its purpose.

(4) Microcomputers

Micros are most expected for computing instrumentation because of its decreasing cost and progressing technology. Micros can be built in a smart



CCA : channel couple adopter
CCU : communication control unit
NCU : network control unit
DC : device coupler
E : experimental instrument

Fig. 3 System Orgamization of Computing Instrumentation

instrument or an intelligent measuring instrument, or used as a device coupler for connection of measuring instruments with a mini computer or an intelligent terminal.

3 Computing instrumentation and networks

(1) System organization

Computing instruction systems are constructed with defferent components connected with each other, which enables efficient use of a system resource. Using a large scale computer for these systems, the better system develop-ment tools can be gained; e.g. large scale files can be used for data retrieval, and an exclusive file machine can be accessed as a distributed file.

Fig. 3 shows how the computer center and each experimental instrument interface at the research device couplers to exchange data via data high ways, and communicate each other from remote locations through modems.

(2) Device couplers

A device coupler, so called Research Device Coupler (RDC) by IBM Corp., is an instrumentation interface for experimentalists using an interactive terminal-purpose system. It is a box which can be put on a 19 inch-wide shelf, and can envolve 8 hardware modules which are for system communication digital and analog input/output, program storage, and tape storage. Each module can be combined with any other except a system communication module with a progeam storage module.

(3) Intelligent station for instrumentation

One of the features required for instrumentation in scientific and technological laboratories is flexibility of the measuring instruments.

In measurement of unknown phenomena,, the procedure is so unstable that different methods of measurement must be taken in order by comparing the new result with the former ones until satisfactory data can be gained. With a conventional hardwired system, it is not enough to meet the measurement purpose of the basic experiment, even though the system may be designed in consideration of various phenomena.
If you use a recent microprocessor fixed in the measuring instrument, the system will gain a lot of flexibility under program control.
There is a movement for standardization of programming (structural programming), but the personal programs written with free ideas might seem more attractive.
A small sized hardware is most desirable for a measuring instrument. Those instruments are not constantly used in laboratories; i.e. productivity or cost performance is rather low. To supplement this deficiency, conventional method is a proper design of a measuring instrument, which can measure and process data within predictive phenomema. But whether a phenomenon is without range of prediction or an error, there is no way of recognition or even it can be easily neglected. Recent method of combining a microprocessor with floppy discs made it possible to construct a simple hardware which can store data raw.
An intelligent station for instrumentation is a project which uses a compatible microprocessor in an experimental instrumentation system for general purpose; it can convert data, check formats, and adjust signal levels in order to collect any kind of data from any kind of measuring instruments. Farther, it is aimed to hold an interface for the practical use of a large scale computer's source, to have local files for raw data storage, and to undertake some of the tasks.

(4) Smart measuring instrument

To connect with a computer, a measuring instrument conventionally needs a research device coupler or an intelligent station for instrumentation as a go-between. But by fixing a microprocessor in a digital multimeter or as oscilloscope, it is being possible to connect those instruments directly with a computer.

Smart measuring instrument is an internally programmable product, different from conventional which requires to be programmed by an external computer. Consequently, it has been possible to set up values through keyboards and to make various measurements by programming the measuring procedures instead of conventional way of handling disgusted numbers of buttons on the control panel.

A smart scope is an oscilloscope with a microprocessor and a LTD display fixed inside, which can digitally read some kinds of waves directly. Also the logic scope is on the way of development. It contains two analyzers; one is the logic analyzer which can recognize an error whether logical or electrical by measuring the functional state and representing it with 0 and 1; the other is the timing analyzer which investigate the I/O wave patterns of up to 12 devices by displaying them on the CRT screen as standard timing-diagram.

(5) Data highway

A data highway is a group of lines connected with CPU via some terminals; which can transmit more than one data by time sharing.

A data highway makes wiring cost down and system extention simple; the technique is suitable for distributed systems using a mini or a micro computer; connecting a computer and a terminal by data highway, the cost is far less expensive than connecting directly by numbers of wires.

4 Computing Instrumentation and Interface

(1) Actual interfaces

Interfaces are located between measuring instruments and computers and consist of electronics and softwares. It is desirable that those interfaces can connect any instrument with any computer. However, as a result of remarkable development in various techniques, they have not yet been standardized. Instead, device couplers, interfaces plus variable features are under consideration.

There are some methods of interfacing or connecting instruments to computers; e.g. parallel I/O buses with serial cables, general purpose teletype interfaces with serial ASCII, CAMAC interfaces, and HP-IB teletype interfaces. Especially, CAMAC and HP-IB interfaces are most noticable.

(2) CAMAC vs HP-IB

CAMAC is suitable for more kinds of devices from farther destances with higher speed for transmitting larger volume of data than HP-IB. However, CAMAC is more expensive than HP-IB because of its necessity for a crate and a controller. Recently, economy crates with 13 slots and microprocessor-based controllers are popular to sell.

HP-IB's merits are its simple 16-wire interface and simple instruction system. For connecting a specific device which does not fit HP-IB, redesign of interface circuit is the most simple method.

CAMAC to HP-IB interface is possible if surrounding a CAMAC serial dataway all over the laboratory and setting up a HP-IB device loop in each experimental room for managing instruments.

5 Computing Instrumentation and Software

(1) Program languages for computing instrumentation

As a language for computing instrumentation, only assembler language is in use. However, development of high level languages as real-time

FORTRAN, real-time BASIC, and real-time APL, as well as program-oriented language as PERL (Process and Experimentation Real-time Language) for computing instrumentation is now expected.
As the real-time OS, either a specific OS or a general-purpose OS is used according to the instrumentation types.

(2) Real-time BASIC

Real-time BASICs are implemented by some companies as DEC, HP, and Takeda Riken. Investigations into standardization of Real-time BASIC are made by IPW (International Purdue Workshop) in Purdue University, United States, and Standard Committee for Industrial Computers (chairman; Professor Mitsuru Terao, University of Tokyo) of JEIDA. CAMAC has announced a real-time BASIC oriented for CAMAC, which is an extensive version of usual BASIC where real-time features as process variable operation, interrupt operation, bit patterns, and logic operation are added.

Acknowledgement

This report is a survey of the subjects which were discussed at Computer Instrumentation Committee.

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MICROPROCESSORS IN JAPAN

JAPAN ELECTRONIC INDUSTRY DEVELOPMENT ASSOCIATION

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MICROPROCESSORS IN JAPAN

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Abstract

This paper surveys the most recent (2nd quarter, 1977) status of Japanese microprocessors, including original and second sourcing. Nine companies are producing about twenty kinds of microprocessors. The profile of the original products and the status of the second sourcing are introduced.

1. INTRODUCTION

This paper is based on the materials in the Microcomputer Handbook edited by the first author and will be published soon in Japanese language.

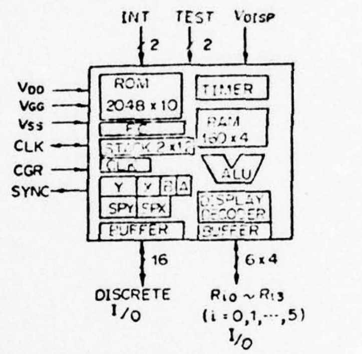
Roughly speaking of Japanese microprocessors, the following three points will be cited: (1) many original microprocessors in the field of low end microcontrollers (4 bit, most of which are single chip microcomputers) and high performance general purpose microprocessors (16 bit), (2) second sourcing of the Intel 8080A and Motorola 6800 family in the field of 8 bit general purpose microprocessors, (3) no original nor second sourcing in the field of bit slice microprocessors.

2. 4 AND 8 BIT ORIGINAL MICROPROCESSORS

Table 2.1 and 2.2 show 4 and 8 bit microprocessors in Japan. They are divided into two groups, single chip microcomputers and others.

2.1 HMCS45A/B

Hitachi announced a single chip microcomputer HMCS45A/B (Fig. 2.1). HMCS45A is the basic type, packaged in 54 pin flat package. HMCS45B is packaged in 42 pin DIP. Users can define optional instructions in addition to a standard set of instructions. An evaluation board, H45EV00, which includes an evaluation chip, HD38600E, is provided. HMCS45A has 16 discrete I/O, six 4 bit parallel I/O, two maskable interrupts. Internal ROM has 2Kx10 bits, and if users wish more, address space is expandable to 4Kx10 bits, adding external (P)ROM chips. It has a twelve bit timer with interrupt capability and a display decoder with five bit input and eight bit output which can be defined by the user.



CGR: internal clock generation request
A : ACC
B : sub ACC
X : 4 bit higher address register for RAM
Y : 4 bit lower address register for RAM
SPX:, SPY:] 4 bit working registers
R_i : data I/O register

Fig. 2.1 HMCS 45B

2.2 MN1400 SERIES

Matsushita announced a series of 4 bit microprocessors, two of which are single chip microcomputers. They are expected to be used for home electronics and other consumer products.

MN1400
MN1400 is a single chip NMOS microcomputer, including ROM, RAM, 29 I/O lines, clock generator and 8 bit binary counter (Fig. 2.2). Its 29 I/O lines include 2 sense inputs, 2 sets of 4 bit parallel input ports, 12 discrete inputs, 4 bit parallel outputs, and an 8 bit parallel output port with PLA. Clock generator has two modes: self oscillation by external RC, or accepting external clock pulses.

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Table 2.1
4 and 8 bit original single chip microcomputers

Model	Manufacturer	First Delivery	Technology	Supply Voltages(V)	Power Dissipation(W)	Op. Temp. Range(°C)	No. of Package Pins	Clock(MHz/Phase)	No. of Interrupt Pins	Decimal Operation	Max. Capacity	Min. Inst. Cycle (µs)	No. of Instructions	ON CHIP ROM	RAM	NO. of Input Port	NO. of Output Port	NO. of I/O Port	Clock Generator	Counter/Timer	Remarks
HMCS 45A/B	HITACHI	76	P	-10 9 (19)	0.1	-20 75	54 42	0.5	2	Y	4KW	20	83	2KW X10	160 X4			40/31	Y	Y	
MN1400	MATSUSHITA	77	N	5			40	0.3				10	75	1KB	64 X4	10	24		Y	Y	*
MN1402	MATSUSHITA	77	N	5			28	0.3					57	768B	32 X4	10	13		Y		
MN1498	MATSUSHITA	77	N	5			40	0.3			1KB		68	-	64 X4	5	13		Y	Y	**
µCOM42	NEC	76	P	-10			42		2	Y		10	72	1920 X10	95 X4	1	26	4	Y		
µCOM43	NEC	77	P	-10			40		1	Y		10	80	2KB	96 X4	8	19	8	Y	Y	
µCOM44	NEC	77	P	-10	0.3		42	0.4 /1	1	Y		10	58	1KB	64 X4			Y	Y		
µCOM45	NEC	77	P	-10		-10 70	28	.44 /1	1	Y		10	58	640 X8	32 X4	1	16	2	Y		
µCOM48	NEC	77	P	-12 (-40)		-10 70	64	.45 /1	2	Y		10	103	2032 X12	160 X4	2	3	1	Y	Y	
SM-1	SHARP	77	P	-16			28	.07 /2					32	882 B	48 X4	3	8		Y		
SM-2	SHARP	77	P	-15			42	0.1 /2					45	1KB	64 X4	3	8		Y		
SM-3	SHARP	77	P	-15			60	0.1 /2				10	57	2KB	128 X4			12/37	Y		
T3444	TOSHIBA	76	N	5		-20 80	40					0.6	13	256 X24	158	5	5	12	Y		*

* Serial I/O included. ** ROM excluded.
All are 4 bits except T3444 (8 bit).

Table 2.2
4 bit microprocessors

These columns are same to the above Table 2.1 — INTERFACE CHIPS

µCOM14	NEC	73	N	12 5 -5	0.6	-10 70	28	1 /1		Y	8KB	5	55	I/O
µCOM41	NEC	76	P	10	.35	-10 70	42	0.2 /2	2	Y	1KB	5	64	parallel I/O, printer, CRT, 2 chip microcomputer,
TLCS -41	TOSHIBA		N	5			42	1			4KB	3	67	printer, on chip : keyboard & display controller.

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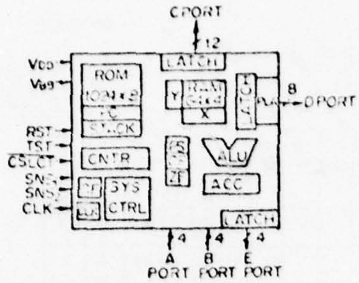


PS : program status
SF : sense flag
CSLCT : mode(sense or count) select for SNS_1
$SNS_{1,2}$: sense inputs

Fig. 2.2 MN1400

MN1402
MN1402 is a 4 bit single chip microcomputer and is a smaller version of MN1400. The numbers of instructions, pins, output ports and the capacity of ROM and RAM are smaller than those of MN1400. The counter is not included.

MN1498
MN1498 is a microprocessor without ROM part of MN1400 and is suitable for products of small quantities.

MN1499 is an evaluation chip for MN1400 and MN1402. The configuration is the same as that of MN1400 with the exception that it has no ROM and has bus for instruction memory and SYNC, READY lines and display decoder is to be added to the chip.

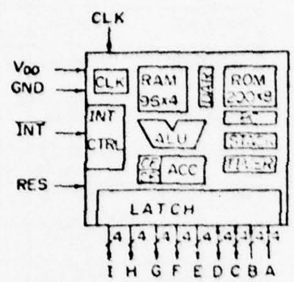
2.3 μCOM40 Series

NEC introduced seven kinds of 4 bit microprocessors, 4, 41, 42, 43, 44, 45, and 48.

μCOM4
μCOM4, introduced in Aug. 1973, was the first NMOS microprocessor in the world. It is a 4 bit microprocessor in 24 pin DIP. It has separate address and data bus and start/stop pin. Four bit I/O interface (μPD752C/D) is provided.

μCOM42
μCOM42 is a 4 bit single chip microcomputer and is developed for systems in which BCD arithmetic is the main operation such as ECR, electronic weighing measure, and desk top calculator with printer. Ports K, S, U and R are respectively assigned to key inputs (K), I/O port for auxiliary RAM (S), key output for key scanning and display segments (U), and signals for digits, printer hammer drive and auxiliary RAM address (R). Hardware simulator (μPD555D) is provided for system development.

μCOM43
μCOM43 is a 4 bit single chip microcomputer designed for the control of devices such as copying machines, facsimiles, sewing machines and vending machines (Fig. 2.3). It has a 12 bit timer and an interrupt line. Bit manipulating instructions and flexible data pointer make I/O facilities powerful. Hardware simulator (μPD556) is provided.



CF : carry flag
CF': carry save register
DAR: data address register

Fig. 2.3 μCOM43

2.4 SM Series

Sharp is producing three types of single chip microcomputers.

SM-1
SM-1 is for systems with keyboard input and numeric display output. It has three sets of input terminals KN1, KN2 and KF, eight segment output terminals, S1 to S8, and nine timing output terminals, T1 to T9. Segment outputs can drive plasma or LED displays directly. It also includes a segment decoder.

SM-2
SM-2 is a 4 bit single chip microcomputer for control applications

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such as desk top calculators with printer, printer controllers, cash registers, vending machines and home electronics (Fig. 2.4). It has various I/O terminals. Five input terminals (KN1, KN2, KF, AK, TAB) for synchronous inputs, three input terminals (α, β, V) for asynchronous inputs, 4 bit parallel output terminal (F), seven output terminals (S1 to S7) for timing signal outputs, sixteen output terminals (W1 to W15) from a shift register controlled by programs.

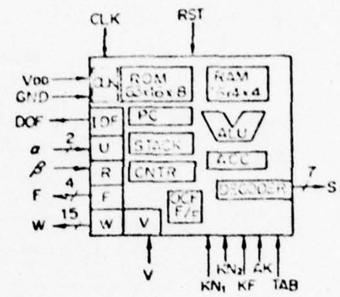
SM-3
SM-3 is a general purpose 4 bit single chip microcomputer, in a 60 pin QIL package, for applications such as cash registers, desk top calculators with printer, microwave oven controllers, sewing machines and POS terminals. I/O terminals of this chip include eight input terminals and four I/O terminals for data I/O, four parallel output lines and ten output terminals for strobing. A discrete output and twenty two general purpose output terminals, seven of which can be used as a segment driver, are also included. Hardware emulator is aprovided.

2.5 Microcontroller and TLCS-41

T3444
T3444 is a fast NMOS microcontroller, with 8 bit data bus, driven by micro-instructions of 24 bits and 625ns cycle time (Fig. 2.5). It is especially suited for the control of high speed devices, such as floppy disks and digital cassettes, although it is also fit to medium or low speed controllers. The control ROM (256x24 bit) is mask programmable. Using this chip, Toshiba has developped two kinds of controllers, one for floppy disks and one for digital cassettes, which can be used as the peripheral I/O of microcomputers such as Toshiba TLCS-12A.

Its micro-instruction includes (1) serial input and shift, (2) cyclic shift among B registers, X/Y RAM and C register, (3) cyclic code operation, (4) skewed transfer between Y RAM and B registers. Hence this processor has the ability of fast data handling such as (1) serial-parallel transformation of input or output data, (2) cyclic code generation and checking, (3) data format generation and checking, (4) data buffering and linking, (5) control of device mechanics.

TLCS-41
This is a 4 bit NMOS single chip microcomputer. It is fit to the devices



DOF: discrete ouptput flag
U :
R :] input latches
F : latched output from ACC
W : serial to parallel conversion register
OCF: output control flag
α :
β :] asynchronous input latches
V :
KN_1 :
KN_2 :
KF :] synchronous 1 bit input ports
AK :
TAB :
s : strobing signal

Fig. 2.4 SM-2

which require key and display operations like ECR. It includes key and display controller which enables control of the 64 push keys and 16 lock keys at the same time, and display of 16 digits and 16 LEDs at the same time. Its 67 instructions include the arithmetic operation of up to 16 digit BCD and block transfer of up to 16x4 bit data. External and key interrupts are acceptable. Restart from the arbitrary address is possible. Interface chips for printer control, T3538 and T3473, are available.

3. 12 & 16 BIT ORIGINAL MICROPROCESSORS

Table 3.1 shows four kinds of 12 and 16 bit Japanese original microprocessors.

3.1 μCOM-16

μCOM-16 is a 16 bit NMOS microprocessor controlled by micro-instructions (Fig. 3.1). The CPU is composed of three components: RALU (Register and Arithmetic Logic Unit),

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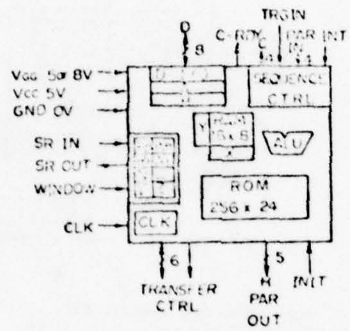

R_0, R_1 : receiver buffers
W_0, W_1 : working registers
N : negative flag
C : carry flag
T : transmitter buffers
Z : zero flag

Fig. 2.5 T3444

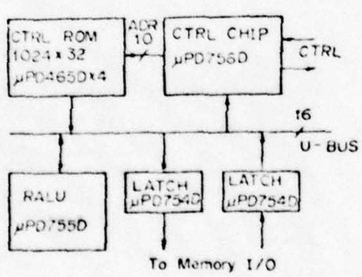

Fig. 3.1 μCOM-16
system diagram

Micro-instruction ROM, and Control Chip. It is suitable for emulation of 16 bit processor or designing special purpose computers. RALU chip contains 16 general purpose registers and ALU, controlled by micro-instructions. Control chip contains a mapping array which can decode 100 micro-instructions. Users can define their assembler level instructions by specifying the mapping array and control ROM.

3.2 L-16A

L-16A is a 16 bit NMOS single chip microprocessor introduced in 1975 (Fig. 3.2). In addition to the powerful minicomputer-like instructions, it has instructions for byte and digit operations. Memory capacity is 64K word (128K byte). Main I/O interface chips are DMAC (DMA Controller) and SCA

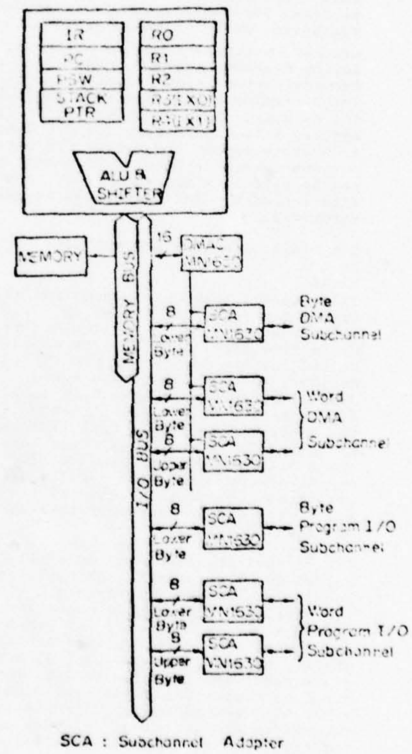

Fig. 3.2 PANAFACOM L-16A
LSI system configuration

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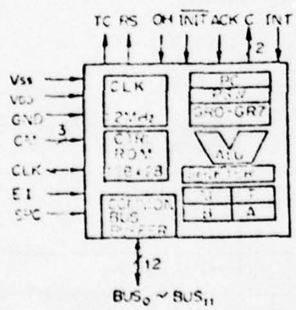
(SubChannel Adapter), which make total system compact. DMAC has two modes: burst mode (200K word/sec) and interface mode (50K to 100K word/sec). Byte and word transfer is provided. SCA is a programmable 8 bit parallel I/O interface chip with four input modes and two output modes: direct input, strobed input, pulse input, interrupt input, direct output and pulse output. Software and hardware for channel interface to the minicomputer, PANAFACOM U or MAC7, are available and provide mini-micro hierarchy systems.

3.3 TLCS-12A

TLCS-12A is a 12 bit NMOS microprocessor with 5V single power supply (Fig. 3.3). This is a revised version of its predecessor, TLCS-12, which was introduced in 1974. It is controlled by microprogram internally, and has Multiply and Divide instructions. Its internal eight word general registers can be treated as memories located at the top of the address space. It has powerful interrupt capability: 8 terminals for interrupt requests,



TC : timing control
RS : run or stop
OH : operate or halt
C_1, C_2 : common bus status
CM_{1-3} : control modes from console panel
EI : external clock or internal clock
SPC : operating speed control
GR_{0-7} : general registers
T :
W : working registers
A :
B :

Fig. 3.3 TLCS-12A

maskable vectored interrupts, and alterable interrupt priority. Clock generator is included in the chip with internal RC and also can be controlled by an external Xtal or RC.

3.4 TOSBAC-40L

This is an LSI version of 16 bit Toshiba minicomputer, TOSBAC-40C. TOSBAC-40L is completely software/hardware compatible with the minicomputer. Users can use powerful software packages such as high level languages (Fortran IV, COBOL, PL/40), DOS, POPS (Process Operating System), FTS (Free Time System), TCS (Tele-Communication System), HSS (Hierarchy Service System) and TMCS-40 (Toshiba Minicomputer Complex System) which supports multiprocessor system for real time control of up to 5 CPUs as well as various peripheral devices. It also has floating point and double precision arithmetic instructions as a standard feature. The 10"x10" CPU board contains an ACU (Arithmetic and Control Unit), five BCU (Bus Control Unit) and microprogram ROM.

4. SECOND SOURCING

As mentioned in Section 1, Japanese semiconductor manufacturers second source Intel 8080A and Motorolla 6800 family. Some produce fully compatible ones and the others upgraded ones (Table 4.1). NEC and Hitachi have cross-licensed with Intel and Motorola, respectively, concerning microprocessors and related technology.

5. TRAINING KITS

One of the most remarkable recent events on the microcomputer industry has been the advent of training kits. TK-80 by NEC was the first one which appeared in 1976. The success of the TK-80 stimulated other microprocessor manufacturers to supply training kits for users. Table 5.1 shows the specifications. Common features are as follows: (1) not expensive (about ¥100,000 or $370) (2) has basic keyboard and display (usually a few tens of keys and 7 segment LEDs) (3) has basic monitor program (4) assumes use of audio cassette for backup (5) complete set of manuals or textbooks.

TK-80

TK-80 by NEC has twenty five keys and eight seven-segment displays to give users programming facility by hexadecimal codes. The main features of the hardware are CMOS RAM and EAROM. Battery backup is available. A short

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Table 3.1 12-16 bit original microprocessors

Model	Manufacturer	First Delivery	Technology	No of Chips	Supply Voltages (V)	Power Dissipation (W)	Op. Temp. Range (°C)	Package Pins	Clock (MHz/Phase)	No. of Interrupt Pins	Min. Inst. Cycle (µs)	No of Instructions	INTERFACE CHIP: Parallel	Timer	Interrupt	DMA	Floppy Disk	Cassette MT	Printer	UART	USRT	Modem	CRT
µCOM16	NEC	75	N	2	-5 5 12	0.4	-10 70	42	2/2	1	1	4	Y				Y	Y		Y			
L-16A	PANAFACOM	75	N		12 5 -3	1.2	-10 70	40	2/2	3	3	33	Y	Y		Y							
TLCS-12	TOSHIBA	76	P	1	-5 5	0.8	-20 80	42	1 /3	8	3	17	Y		Y	Y	Y	Y					
TLCS12A	TOSHIBA	75	P	1	-5 5	0.5	-20 80	36	12 /1	8	7	108	Y		Y	Y	Y	Y					
T-40L	TOSHIBA	76	N	5	5	1.3	0 70	42	3.3 /1	5	2	17	Y	•	•	•	•	•	•	•	•	•	•

• card level

Table 4.1 Second sources

Model	Manufacturer	First Delivery	Op. Temp. Range (°C)	INTERFACE CHIPS: Parallel	Timer	Interrupt	DMA	Floppy Disk	Cassette MT	Printer	UART	USRT	Modem	CRT	Instructions
µCOM80 /µPD8080A	NEC	75	-10 70	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	SUB Flag (for decimal SUB), otherwise same as i8080A.
µCOM85	NEC	78		Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	same as i8085.
MELPS-8 /M-58710s	MITSUBISHI	75	0 70	Y	Y	Y	Y								same as i8080A.
HSM -3900	OKI		0 70									Y	Y		same as i8080A
MB8861	FUJITSU	75	[illegible] 70	Y	Y	Y	Y	Y			Y	Y		Y	additional instructions: NIM: AND Immediate, OIM: OR Immediate, XIM: EX-OR Immediate, TMM: TEST Under Mask, ADX: ADD Index Register, otherwise same as MC6800.
HMCS 6800	HITACHI	76	-20 75	Y	Y		Y	Y	Y		Y			Y	same as MC6800.

program, two dedicated keys, and a free space on the board are provided for audio cassette interface.

EX-5
TLCS-12A EX-5 by Toshiba is a simple kit. Standard board is cheap and has no ROMs nor keyboard displays but binary switches and LED lamps. Hexadecimal keyboard and display are available as options.

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Table 5.1 Learning Kits

model	manufacturer	processor	supply form	size(mm)	ROM (supplied / full)	RAM (supplied / full)	parallel I/O port	serial I/O (TTY)	audio cassette I/O	keyboard	display	power supply	monitor	optional cards
TK-80	NEC	μPD8080A	kit	180×310	768B / 1024B	512B / 1024B	4	only soft	only soft	hexa:16 CTRL 9	hexa:8	5V 0.9A 12V 0.15A	768B	TV interface
TLCS-12A EX-5	Toshiba	TLCS-12A	kit	180×230	0 / 1024×12	256×12 / 1024×12				binary: 12+4 (hexa: option)	binary 12 (hexa: option)	5V 1A -5V 0.4A -9V (for PROM)	no	console, expander
LKIT-16	Panafacom	L-16A	kit	220×300 226×160	1024×16 / 2048×16	512×16 / 1024×16			yes	assembly lng. 48	hexa:8	5V 1.5A -12V .15A -5V .05A	1024×16	
LKIT-8	Fujitsu	MB8861	assembled	160×270 200×120	1024B / 2048B	768B / 1280B	4	yes	only soft	hexa:16 CTRL 9	hexa:6	5V 1.4A	yes	
H68/TR	Hitachi	HMCS6800	assembled	200×230	4096B / 4096B	1024B / 3072B			yes remote con-trol-lable	alpha-numeric:48	alpha-numeric:14	5V 2.5A	yes also assembler	floppy disk

LKIT-8

LKIT-8 by Fujitsu is similar to TK-80 with a major difference of its processor. The console board is separated from the main board, and can be removed when it is not necessary.

LKIT-16

LKIT-16 by Panafacom is based on L-16A which is a 16 bit original microprocessor with high performance. The prime feature is that each key of its keyboard corresponds to a machine instruction or a mnemonic code. The kit has two stages of boards: the keyboard and the main CPU board. Audio cassette interface is fully provided including built in connectors to the tape recorder.

H68/TR

H68/TR by Hitachi is the newest and one of the most useful. It has a basic symbolic assembler as well as a monitor program in 32K bit mask ROM, and also has a compact keyboard and a special display terminal on which 26 alphabets, 10 digits, and 12 other characters can be input or output. The meaning of "special" is that each of 48 characters has its own key but is displayed on usual 7 segment displays using rather special forms of characters (see Fig. 5.1). Additional point to be noted is the facility for cassette control by relays. This enables users to edit source or data files using two tape recorders automatically controlled by the microcomputer, using an optional editor program.

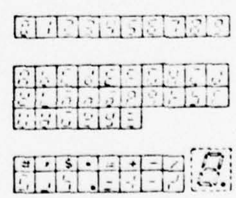

Fig. 5.1 Special 48 character set by 7-segment display

REFERENCES

1. R. Mori (ed.), Microcomputer Handbook (Asakura Shoten, Tokyo, to be published).
2. Manuals of corresponding processors and kits.

Micro Computer News

[Digest translated from Japanese]

Vol. 1, No. 1, October, 1976

Japan Microcomputer Club
The 1st Ohkura Building 4F
2-1 Nihonbashi, Chuo-ku, Tokyo, Japan

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Japan Microcomputers Club At Its Start

By Shigeru Watanabe (President)

University of Tokyo

Tiny microcomputers have realaized a human dream. These days anyone can use a computer, which was out of reach several years ago. Three features of microcomputers, easy to build, cheap to purchase, and widely applicable, have attracted young generation as the intellectual "hobby".

Japan Microcomputer Club has made its meaningful start in this fall. Microcomputers are now available not only for experts but for anyone, anywhere and at anytime.

Since first introduced into Japan, microcomputers of American birth have been developed in Japan and many excellent programs have been created. Everyone, however, has not ever dared build a computer of his own.

Popularization of microcomputers has made it possible or young intellectuals to use them in various areas. That is, every amateur computer hobbyist has a chance of being an inventor of new and first products of the world.

These invents may be leading lights for the future of our country. Through our Club, we hope new products or techniques will be announced to the world.

Aims of Japan Microcomputer Club

It is the club for amateur computer hobbyists who are willing to build there own computers and obtain technical information.

Activities

(1) Publication of Microcomputer News

(2) Microcomputer Symposium

(3) Microcomputer Laboratory

(4) Observation Study

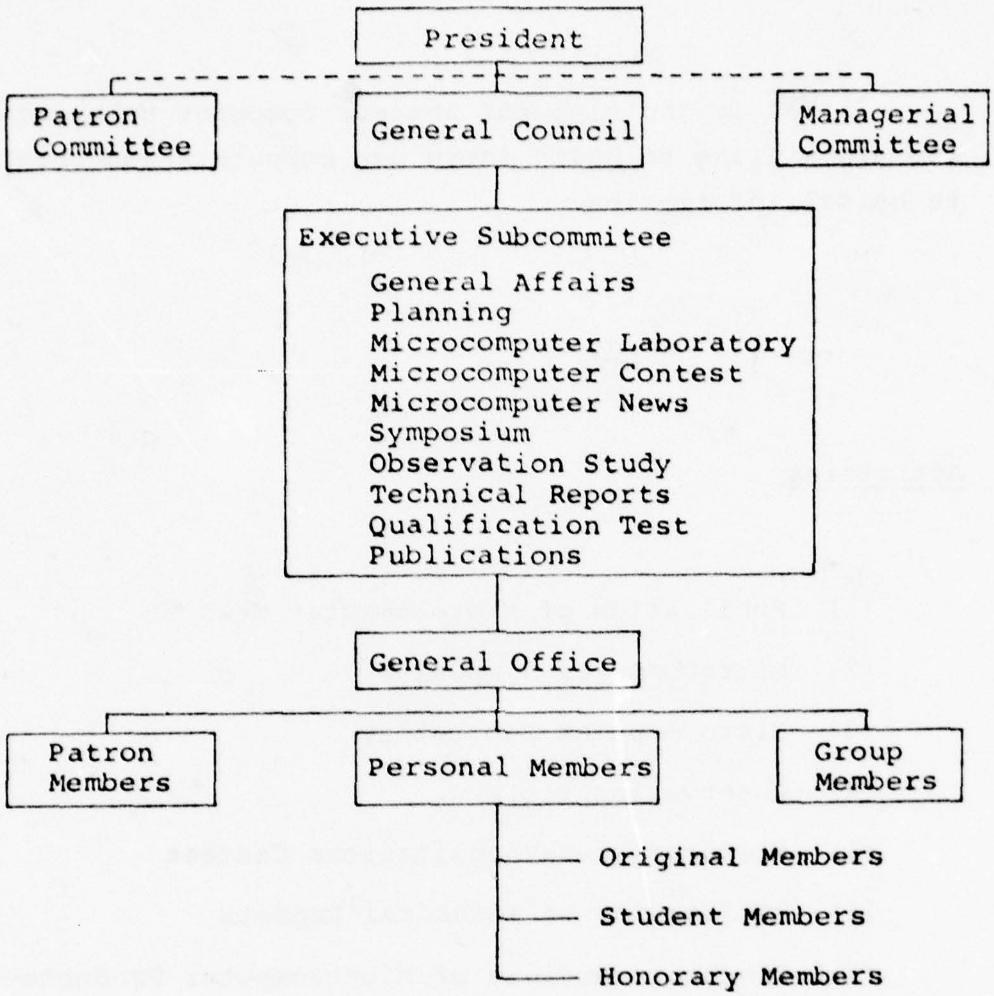
(5) Microcomputers Applications Contest

(6) Publication of Technical Reports

(7) Discount services of Microcomputer Products

(8) Investigation and Data collection

Organization



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	Aiiso, Hideo	(Keio Univ.)
	Ohkawa, Yoshikuni	(Univ. of Gifu)
	Yaita, Tohru	(Hosei Univ.)

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What Does A Microcomputer Mean ?

By Koji Yada

Electrotechnical Laboratory

The diffinition of "micro-computer" is not easy, because the areas of its techniques and applications are far extended. Elementary knowledges of microcomputers hardware systems is offered.

Program For Calculation Of CRC

By Itsuo Yamaura

Electrotechnical Laboratory

A program that calculates CRC (Cycle Redandancy Code) is described.

Microcomputer Kits Information

Several microcomputer kits is introduced. Comment on each kit is described.

General Information

Reference books for beginners is presented.

'76 Lives & Information Fair

Through our Club, five application products as below are to be displayed.

- Electronic musical instrument by microcomputer application (Toshiba)
- Automatic musical performance using a training kit (NEC)

- Animation drama by training kits using a domestic colour TV (NEC)
- Braille printing device by microcomputer control (Welfare Technology Association)
- Home-made computer (NS)

Announcements

1. Microcomputer Laboratory

Workshop which serves the Club members with lending assembly tools, assistance for debugging, and technical consultation is under consideration.

2. Microcomputer Symposiums

Nine Simposiums will be held in autumn, 1976.

First Symposium Oct. 2
"NS Microcomputers" by Kenji Fujimoto (NS)

Second Symposium Oct. 9
"NEC Microcomputers" by Isao Uchida (NEC)

Third Symposium Oct. 16
"Fair Child Microcomputers" by Koichi Hatakeyama (TDK Fair Child)

Fourth Symposium Oct. 23
"Toshiba Microcomputers" by Taiga Hayashi (Toshiba

Fifth Symposium Oct. 30
"Fujitsu Microcomputers" by Shusaku Ishihara (Fujitsu)

Sixth Symposium Nov. 6
"Hitachi Microcomputers" by Tsugiyuki Watanabe (Hitachi)

Seventh Symposium   Nov. 13
"Intel Microcomputers"   by Nobuo Kamata (Intel Japan)

Eighth Symposium   Nov. 20
"Mitsubishi Microcomputers" by Nobuo Matoba (Mitsubishi)

Nineth Symposium   Nov. 27
"Motorola Microcomputers"   by Tadashi Horicuhi (MS)

Mini-News

1. Up-to-date Microcomputers Peripherals

Peripheral equipments for microcomputers must be small and cheap. Some peripherals which were recently published are introduced.

2. *Micro-Communications*

Up-to-the-minute applications announced in U.S.A. are described.

Microcomputers Application Contest

For developing techniques, directing a spotlight on to unknown talents, and encouraging new ideas, we are planning a contest in March, 1977. Anyone in the world can be an entrant. Subscription should be sent not later than Feb. 29, 1977. Not only winners but also all the entrants will have marvelous prizes!

Micro Computer News

digest translated from Japanese edition

Vol. 1 , No. 2 , December,1976

Japan Microcomputer Club

Ichikawa Building 4F

2-1 Nihonbashi, Chuo-ku, Tokyo,Japan

Companies' activities to microcomputer hobbyists in America

By Nobuhiro Sato
Sord Computer Systems

Microcomputer business in America is described in this article. First, the author classifies microcomputer businesses into three groups as follows:

(1) Hardware Sales
(2) Software Sales
(3) Various kinds of Services Sales

He reports that most of the American microcomputer hobbyists start their activities by buying microcomputer systems and that there exists a clear distinction between a microcomputer for professionals and that for amateures.

Secondly, processors, peripherals, softwares, computer-education and periodical publications are described briefly.

Finally, he suggests us that it is very important to consider the range of system expandability from the beginning.

Microcomputer magazines in America

By Haruhisa Ishida
University of Tokyo

Following famous microcomputer magazines in America are introduced briefly:

(1) Dr.dobb's journal of computer callisthenics & Orthodontia
(2) BYTE
(3) Interface Age
(4) Creative Computing
(5) People's Computer Company News

He recommends us to read any of these magazines to acquire the advanced technology and American microcomputer state of affairs.

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Backside stories of microcomputers
(No.1) The dawn of a microcomputer

By Ryu Kon
Contribution

How and why the microcomputer, MCS-4 ,was developed is described briefly.

The author says," There are two kinds of dramatic stories in the origin of microcomputers. One is the Silicon Valley Story,which is related to the production technology of LSI. The other is the Electric Calculator Stories,which are related to ideas and designs."

This No.1 story tells us how LSI for electric calculator was designed and that it was only INTEL corpolation that tried to develop an universal standard logical device to satisfy various kinds of desires provided from a lot of Japanese calculator makers.

He says ," It is quite ironical that the Japanese calculator makers,which triggered the dawn of microcomputer age ,went bankrupt before the prosperity of microcomputers in these days.

(to be continued)

How to assemble microcomputers (No.1)

By Shinichi Ikeno
Nippon Telegraph & Telephone Public Corporation,Musashino Electrical Communications Laboratory

He is going to report not only how he designed the 8008 microcomputer system ,but how he assembled it. This No.1 report is only a preface to his experimental stories.

(to be continued)

Present state of microcomputers and their future (No.1)

By Yoshikuni Ookawa
University of Gifu

The author describes the history of digital computers, IBM 709 ('53),PDP 5 ('63) and INTEL 8008 ('73). He predicts that something extraordinary will happen in 1983. IBM 709 is characterized as a computer for borrowers. PDP 5 is characterized as a computer for users. INTEL 8008 is characterized as a computer for hobbyists.

Relation between the number of bits in a word and a proper memory size is described. He indicates the following table:

word size (bits)	maximum allowable memory size to maintain high efficiency
4	2 k byte
8	8 k byte
12	16 k byte
16	32 k byte

He concludes in the end that the prosperity of 8 bit microcomputer is entirely dependent on the number of problems that can be programmed into 8 k byte memory array.

Whether such a problem exists or not will be discussed in the next news.

(to be continued)

Microcomputers and our daily life

By Chikara Sato
Keio University

Most of the people say," In a near future,microcomputers will make great effects on our daily life." The author also says,"We will be able to get a lot of pleasure from microcomputer applications at homes,for examples T.V games."

Miscellany on microcomputers

By R.B.
Contribution

The author discusses the instructions and architectures of the following 8 bit microcomputers:

(1) 8080 (INTEL)
(2) 6800 (MOTOROLA)
(3) 6502 (Mos Technology)
(4) SC/MP (NS)
(5) F8 (FAIRCHILD)

He insists that 256 byte memories are enough to make an ordinary program for 8 bit microcomputers, for example "Life game" and "Fourier analysis".

New products informations

(1) Intellec PROMPT 80
-8080 microcomputer design aid-
(2) TEC-80A
-8080 microcomputer learning device-

Announcement

(1) First Japan Microcomputer Club Grand Meeting

Date : 1976.Dec.4th
Time : 1,30-5,00 (p.m.)
Contents :
(a) Grand Meeting (1,30-2,10)

Opening declaration	By T.Hayashi
Chairman's address	By S.Watanabe
Reports on the establishing process	By K.Fuchi
Reports on the managing policies	By H.Miura
Closing declaration	By S.Narata

(b) Memorial Lectures (2,15-4,00)

Outline of Microcomputers　　By H.Aiso
Microcomputer clubs in America
By H.Ishida
Microcomputers and Laser　　By K.Sakurai

(c) Party (4,00-5,00)

(2) Microcomputer Symposiums

The schedule of the microcomputer symposiums (from Dec.'76 to Apr.'77) is described as follows:

10th　Dec.11
"Microcomputer application to automation"
11th　Dec.18
"Microcomputer application to numerical control"
12th　Jan.22
"Microcomputer application to electric musical instruments"
13th　Jan.29
"T.I. microcomputers"
14th　Feb.5
"Prolog microcomputers"
15th　Feb.12
"How to assemble a T.V. display"
16th　Feb.19
"Microcomputer application to industrial processing"
17th　Feb.26
"Electric devices controlled by microcomputers"
18th　Mar.5
"How to learn microcomputers
-guidance and introduction-
19th　Mar.12
"How to select microcomputers"
20th　Mar.19
"Fundamentals of microcomputers"
21th　Mar.26
"Know-How of microcomputer assembling"
22th　Apr.2
"Softwares of microcomputers"

23th Apr.9
"Printer interface"
24th Apr.16
"Casette interface"
25th Apr.23
"Floppy disk interface"
26th Apr.30
"Tools for microcomputer program development"

(3) Service for acquisition of anything necessary for members

For the convenience of members to make a microcomputer system, service for acquisition of anything necessary ,for example microcomputer kits,power supplies and parts etc, is introduced. Male order is , needless to say , possible.

(4) Guide to a contribution

A guide for a contribution is described briefly.

Micro Computer News

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Japan Microcomputer Club

Ichikawa Building 4F

2-1, Nihonbashi, Chuo-ku, Tokyo, Japan

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(1) Special Subjects

First Japan Microcomputer Club Grand Meeting

Chairman's address

By Shigeru Watanabe
Tokyo University

Japan Microcomputer Club received a lot of approval since it established on 1st of December. He thinks people who organized this club are pleased to know that there are many Japanese who want to take this opportunity to begin studying microcomputer.

He believes it is very important for Japan to create something unique to Japanese products. Because if Japan produces products which are invented in foreign countries cheaply and exports them, it always creates friction between Japan and other countries.

He hoped for development of microcomputer technique in Japan in future and it will make Japan's microcomputer technique firm and well established.

Reports on the establishing process

By Kazuhiro Fuchi
Electrotechnical Laboratory

Japan Microcomputer Club now has a membership of about 500.

Microcomputer News are printed bimonthly in English with the aid of Mr. Umeda and others, and they are sent to U.S.

Microcomputer Symposiums are held every Saturday. There are 40 to 110 members attend every symposium. It is held not only for the members but also who attends the symposium.

Also there are a lot of new activities planed ahead.

Reports on the managing policies

By Hirofumi Miura
Tokyo University

Accounting report November 30th

Income	3,000,000 Yens	
	2,500,000 Yens	Membership Fee
	500,000 Yens	Symposium
Expenditure	3,500,000 Yens	Printing and Communication Expenses

As a result, it shows a deficit of 500,000 Yens, but we have 500,000 Yens affears.

Managing policies:
Because the communication expenses become great expenditure, News will be printed monthly and it will become a good magazine with solid materials.

Special lecture

- Outline of Microcomputers -

By Hideo Aiso
Keio University

His lecture is about Microcomputer technique and its future.

1) Characteristics of LSI
LSI as well as all semiconductor is based on mass production.
It is necessary to find great demands.
Mass production is essential to cost down and it will increase reliability.
It costs a lot more on a development than its production.
New development's test costs money and time, and unexpected problems are involved.
2) Limits from Microprocesser's Structure relation among Microprocesser's cost, defect and size.
3) LSI's blueprint and its development are united. How to find out a fault in a large computer is very difficult problem.
4) LSI has a great influence on the whole electro-technique field.
5) The size of Microcomputer and Multiprocessor.
6) Electric power consumption and Interface.
7) Microcomputer in future.
8) Minute processing technique and device for VLSI (Very-Large Scale Integration).
Light is used to make a blueprint for minute processing technique. In order to increase intensity, the technique of X ray, electron beam and Laser ray are used.
To make device itself small, new development of a circuit is expected.
9) Actual operation density
10) Problems of Software
The problem of Software is on the productivity. In these ten years, only 3% has been improved in the case of large computers.
11) Variety of application.
12) Software development and education.

* New Products Information

1) TLCS-12A EX12/10
   T3190 Microcomputer learning device and design aid.

2) MCS48, 45 Microcomputer series.
   New CPU8048 and 8085

Microcomputer Club in America

By Hisaharu Ishida
Tokyo University

He reports that microcomputer clubs in America have various activities for amateurs to enjoy. Because the members of American microcomputers are not only professors and researchers, but older grammar school students and high school students. First they enjoy playing games, then learn BASIC.

Kits in America are sold cheaply at microcomputer stores. These store-keepers help amateurs kindly, and they hold training courses and sell micro-computer magazines and books of their interest.

On these microcomputer magazines, there are articles on programming by Basic. Mr. Ishida thinks it is very useful for amateurs. He suggests that microcomputer magazines should help amateurs solve Software problems. He also wishes for standardization so that it is cheap and easy for amateurs to exchange their Softwares among them.

(2) Visit to Akihabara

By Sanshiro Kobayashi
Tokyo Industrial Technique Center

He introduces good shops for acquiring materials necessary for micro-computers in Akihabara, Tokyo.

(3) How to assemble microcomputers (No. 2)

By Shinichi Ikeno

He reported how he assembled his second microcomputer 6800 step by step.

(4) Microcomputer magazines in America

By Haruhisa Ishida

1. Dr. Dobb's Journal of Calithenics and Orthodontia's (Jan. Feb. Jun. /Jly. Aug. Oct. Nov. /Dec. 1976) articles are introduced.
2. BYTE (Sept. Oct. 1975, Oct. Nov. 1976)
3. Interface (Oct. 1976)
4. Creative Computing (Sept. /Oct. Nov. /Dec. 1976)
5. People's Computer Company (Sept. /Oct. 1976)

(5) *Microcomputer Short Short "Kagezen"*

By Takashi Kino

It is a sorrowful story about a young wife whose hasband is a very diligent microcomputer technician.

(6) Microcomputer And Music

By Kohei Sato

Applications of microcomputer for music composition are talked briefly.

(7) Microcomputer Technician Authorized Exam.

By Seinosuke Narita

Japan Microcomputer Club is making a plan for authorized examinations. He explains what is included in examination.

1. Outline of microcomputers
   Digital Computer, IC, Memory, Microcomputer and Microprocessor
2. Hardware and Digital technique
3. Microcomputer Software
4. Developing tool of Microcomputer

(8) SC/MP Cassette-Recorder Interface.

This article is taken from Application Note of National Semiconductor Co. Block diagram, Interface circuit, Memory and Address Decorder Circuit, recording format, data's output from decorder, write mode, receive mode, and waves by interface circuit are explained in detail by diagrams.

References:
SC/MP Technical Description (Pub. No. 4200079)
SC/MP Users Manual (Pub. No. 4200105)
SC/MP Programming and Assembler Manual (Pub. No. 4200094)

(9) Backside stories of microcomputers.

No. 2 The down of a microcomputer

By Ryu Kon

The successful story of SEIKO Personal Computer S 500 is introduced.

(10) Announcements

1. The first microcomputer symposium special seminar
   Theme: Single Component Microcomputer "MCS48"
   Lecture: Nobuo Kamata
   Time: February 8th.
2. Workshop
   ° General Consult Day will be held once a month.
   ° Special Invitation to Japan Microcomputer School.
3. News from Office
   Members of Japan Microcomputer Club increased to 630 and spread from Hokkaido to Okinawa. The large part of them is the twenties and thirties. Japan Microcomputer Club began to draw attntion of magazines and newspapers and introduced widely.

Micro Computer News

Digest Translated from Japanese Edition

Vol. 2, No. 2 June, 1977

Japan Microcomputer Club

Ichikawa Building 4F

2-1 Nihonbashi, Chuo-ku, Tokyo, Japan

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Creativity and Microcomputers

By Shigeru Watanabe
Professor of Tokyo University

He points out that the ordinary people in their daily life had very few contacts with the large-scale conventional computers before microcomputers appeared. Microcomputers changed this situation. Because microcomputers have two advantages which the large-scale computers do not have: handiness and low price. This change is due to the development of central processing unit which is included in a microcomputer. Anyone, regardless of age, can not only buy a microcomputer, but also can develop creativity through building and using microcomputers.

Our original microcomputer

By Hirotatsu Hashizume & Ichiro Ide
Tokyo University T. S. G.

They are physics students who are the members of Tokyo University Theoretical Science Group. They built their original microcomputer with a front panel without using a manufacture's KIT. Two problems were to find a low cost teletypewriter and to put long programs into their microcomputer which only has RAM. The first problem was solved by using second-hand teletypewriter (interfaced with TTY controller) and the second one was by using *Hexadecimal program* paper tapes.

They wish there will be more exchanges of information about software of microcomputers to help members who wish to build an original microcomputers.

How to sell the technology

By Yoshikuni Okawa
Professor of Gifu University

He points out the difference between American and Japanese research institutions' system of making profits from their developed technology. In Japan the concept of multiclient job system has not yet been introduced. He believes it will bring many profits to Japanese research institutes.

Available Tiny BASIC source tapes for the 8080

By Haruhisa Isida
Professor of Tokyo University

Palo Alto version of Tiny BASIC source tapes and its application "Tiny Star Trek" are available from Tokyo University microcomputer class with the help of Community Computer Center in U. S.

How to make a choice for microcomputers

By Kazuhide Masugi & Yasumi Tokuhara
Astar International Co., Ltd.

This article includes charts which classify microcomputers by features, purposes, prices, and representative products. He suggests these following points should be considered carefully: the selection between the 8080 and the 6800, between KIT and completed products, a balance between features and prices, and extensibility and buckup system.

How to assemble microcomputers

By Shinichi Ikeno
Nippon Telegraph & Telephone Public Corporation,
Musashino Electrical Communications Laboratory

This article explains how to use CMOS memory for applications of programs. He reminds us that in order to use higher programming language the memory should have at least 4K Byte. Therefore the place for the extension of bus driver should be considered before hand on CPU substrate board.

American Microcomputer Magazine

By Haruhisa Ishida
Assistant Professor of Tokyo University

"Personal Computing", "Dr. Dobb's Journal", "Interface", "Interface Age", and "Byte" are introduced. One of the interesting article is large volume distribution of softwares in forms of Bar-Code printed on papers.

House wife and Microcomputer

By Ritsuko Yokotsuka

This article describes her motives for joining this club. She has a experience of software programming and before she got married, she worked with computers. Her dreams came true. Even though she has to take care of her children and house, she was looking for an opportunity to those who are in the same situation like hers.

Announcement

(1) Activities of Japan Microcomputer Club

(a) Editorial Committee

"Microcomputer" magazine has been an organ of Japan Microcomputer Club, but now it is expected to extend its service by making an organ to a microcomputer technical magazine which includes articles of assembling microcomputers.

(b) Research and Investigation Committee

It plans to hold regular seminars, special seminars and exhibition of member's works approximately 30 or 40 times a year.

(c) Microcomputer Laboratory

It offers a place for exhibitions of original works, and for work shops to members of the club.

(d) Microcomputer Standardization Committee

Making reference to Kansas City standard, it holds technical investigation of Audio Set standard. It is expected to be of service to members for exchangeing microcomputer programs and data.

(e) Microptogram Library Committee

Its purpose is to facilitate exchanges of programs.

(f) Microcomputer Contest Committee

This committee already held a exhibition of microcomputer works and contest. It helped to participate in "Business Show" (promoted by Japan Management Association) and "Microcomputer Show" (sponsored by Japan Electronic Industry Promotion Association) in Tokyo.

(g) Microcomputer Engineer Examination Committee

Its main purpose is to examine microcomputer engineers and technicians in basic techniques and knowledge.

(h) Microcomputer Organization Committee

In order to promote communications among the local members, there are several plans to establish branches of Japan Microcomputer Club. The first branch was established in Nagano District.

(i) Microcomputer Planning Committee

The inspection trips to universities and manufacturers and exhibitions, and overseas investigation group trip are planned.

(2) The schedule of microcomputer research seminars

Microcomputer research seminars are divided into micocomputer regular seminars, special seminars and presentation of microcomputer researches.

- Subjects -

April 9	Microcomputer's software
April 23	Interface of printers
May 14	Interface of cassettes
May 28	Interface of floppy disc
June 11	Microcomputer development tools
June 25	MOSTECK Corp's microcomputers (2-80)
July 9	Interface of Magnetic Drams
July 23	Beginners' Microcomputer Programming
August 13	BIT Slice Computers
August 27	HB-IB Interface and microcomputers

(3) "Microcomputer Circular" magazine
This is used as a source material for microcomputer research seminars.

Micro Computer News

Digest Translated from Japanese Edition

Vol. 2, No. 3 August , 1977

Japan Microcomputer Club
Kikaishinko-Kaikan, JEIDA
5-5-8, Shiba-Koen, Minato-ku, Tokyo,

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Overseas Special Report

"American Microcomputer Hobbyists"

Chikara Sato
Professor of Keio University

He reports the First West Coast Computer Fair in San Francisco and the Electro '77 in New York. The statistics shows the American microcomputer hobbyists characteristics. It shows also that American Hobbyists are interested in microcomputers which cost more than $2,000 rather than ¥300 one-board kit. Their tendency is shifting from TV games to more complex and sophisticated games like higher level computing program and business games.

The Selection of Microcomputer Devices:

"What would be your best selection of devices?"

Group Akaza

This describes many types of one-board kit with CPU, ROM, RAM and interface. The focus is on the one-board kit which can be used as a part of circuit (process controller) when the expanded functions are acquired, and also can be expanded to multi purpose microcomputer in order to become a bases for program developing implementations. Intel SDK-85, NEC TK-80, MT corporation PROTO-80 and various other companies' kit are introduced with detailed descriptions.

Peripheral Devices for LKIT-16

It explains step by step how to expand functions of microcomputer. It devided into power supply, programming, connection to tape recorder, automatic music performance, and connection to TV set.

What is a low cost Training Kit MP-80?

Yoshi Ishida
Logic Systems International

It advises the beginners how to cope with the problems about building a kit, programming, and cost of kit vi.e the expanding ability when the users buy a new kit.

Character Display

Nobuhiro Kijikawa
Nagano Microcomputer Club

It is about how to build a CRT Character Display by $100.

Stable power supply for Microcomputer

Sanshiro Kobayashi

It is about direct current stable plwer supply by serial control method.

NIBL

Masuda
National Semiconductor

This is a serial article which describes the interpreter NIBL for TINY-BASIC to operate on SC/MP chip. NIBL can be executed by SC/MC II CPU. 4K byte ROM, 2K byte RAM, teletype and can implement the users' program into ROM. The article includes the required hardwares, multipurpose I/O function, P-ROM, basic programming.

MEK 6800 Motorola Microcomputer DII Kit

Toshio Nakazawa
Kanazawa Technical College

This shows very technical building method of MEK 6800.

Interface for X-Y Plotter

Naofumi Nakajima &
Yasujuki Suzuki
Tokyo University

This is how to make a program for numerical value control positioning device's interface using Intel SKD-'80. The flow chart and complete program are listed.

TINY BASIC : Programming and features

Kiyoshi Saito
KMC

BASIC has many features which are very useful for microcomputers.

1 simple programming grammer
2 operations are easy because compiller and assembler are unnecessary.
3 immediate execution is possible by inputting a part of a program and re-execute after modificatio.s are made.

He suggests readers to make BASIC interpreter by oneself in order to enjoy programming, to make a interpreter suits best to one's own purpose, to modify the interpreter in case of a expansion of hardware functions. Required hardwares, the functions of interpreter, input parts, programming control command execution, and terms in flow charts are wxplained.

MICROCOMPUTER NEWS

1 Research Seminare for Microcomputer

1 Introduction to Microcomputer Programming
2 Bit Slice Computer
3 Microcomputer Devise; TOSHIBA, HITACHI, FUJITSU products.
4 CAMAC interface and Microcomputer
5 HP-IB Interface
6 Microcomputers-Pana Facom Micro Cassette recorder
7 Introduction to BASIC
8 Interface with Audio Cassette
9 Control Program for Floppy Disc
10 DMA production
11 Use of IC memory
12 Use of TTL:

2 Japan Microcomputer Club branches are established in many parts of Japan.

3 From Office

News letters from microcomputer clubs in America are arrived.

1 Amateur Radio Research and Development Corp.
2 Rochester Area Microcomputer Society
3 Philadelphia Area Computer Society
4 North Orange Country Computer Club
5 Northwest Computer Club
6 Southeastern Michigan Computer Organization
7 Amateur Computer Group of New Jersey
8 Technological Developments
9 The Computer Faire
10 National Semiconductor Co.

Micro Computer News

Digest Translated from Japanese Edition

Vol. 2, No. 4 October, 1977

Japan Microcomputer Club
Kikaishinko-Kaikan, JEIDA
5-5-8, Shiba-Koen, Minato-ku, Tokyo

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Microcomputer Family

It is a serial report on the actual example of hobbyists enjoying microcomputer at their homes. The pictures show that a family enfoying synthesized music and graphic art controlled by microcomputer with neighbor children.

Peripheral Devices: Mini printer, Key board, Encoder and T. V. display

TK 80 NEC) can have 1 K byte ROM and 1 K byte RAM plugged on board. But in order to make it fit for multi-purpose by extending RAM and I/O externally it is necessary to put buffer in address bus.

As a character display for microcomputer Adteck System Science Co. Television Character Display Unit is selected because this can provide more functions than Video RAM in compact size and the price is about $130 including the modulator to T. V.

An electric discharge printer unit in which the complete interface circuit are included can print only by inputting the ASCII code.

What are the interface devices?

A key board encoder consists of a key board arranged like a type-writer and LSI encoder which inverts signals into standard codes like an TSCII

As a T. V. display a character display is chosen because the same number of byte as the number of characters is needed for memory. Even a character display can not show an arbitary diagram its program is much easier than a graphic display.

Digital Cassette tape memory device, interface for audio tape recorder, electric discharge and heat sensitive printers, floppy disc, character display terminals are explained and many real products from various companies are listed.

The Complete Production of FSK Cassette Interface

This article advises you to use FSK (FM Type) modulation method because of low noise and usefullness to exchange data through telephone lines and amateur wireless.

When there is not any frequency member counter or other measuring

instrument available any musical instruments will be of use to regulate frequency.

Microcomputer Protector

This microcomputer protection is for excess voltage to flow into the wrong circuits. It consists of OP.AMP, zener diode and SCR. Detailed SCR selection points are described.

Prerequisite for BASIC

As a CPU board KIM-1 using 6502 and 8 K byte RAM board and CRT display are necessary to enjoy BASIC. The total cost of devices would be about $150.

Microcomputer's Future and Current Cituation

Microcomputers' function, features, and merits of finished products are discussed. SOL Microcomputer which is a developped products by Processor Technology Co., in California is introduced.

CRT Display Device

This display device is able to draw complex characters by combination of basic patterns such as circle, square, triangle and line on static electricity deflected CRT like an oscilloscope. Not only a static pattern but also a pattern can be moved dinamically by a internal program and by receriving analog voltage directly from outside.

Hardware structure, Software and examples of applications are described with diagrams.

Random Number Table

This is an introduction to BASIC programming.

Microcomputer Programming

This includes two basic simple program: TK-80 square root program by subtracting odd numbers, and expansion memory checking program. Flow charts and the complete programs are listed.

Assembler Language and Program Input

Assembler Language programming are described step by step with an example using LIKT-16.

F8 Micro Machine (MMI)

Fairchild Co. product,

One chip microcomputer F8 Micro Machine is developed with the n-channel silicon-gate MOS technique. It can be used for an application to low cost controller. Basic functions, features, interrupt control circuits, multi-chip F8, Instruction Set are explained in detail.

NIBL-Application number One.
SC/MP-Disassembler

Disassembler's structure, instruction set, additional hardware, and execution of SC/MP dissassembler are described.

Microcomputer Glossary

Letter and Questions from Readers.

MICROCOMPUTER NEWS

1 Regular Seminar

This will be held from November and divided into three courses; beginner, intermediate, advanced.

The themes for each course such as microcomputer building and software basics; Interface and Application Programming; Assembler and Macro Programming are just a few examples.

APPENDIX I

LIST OF REGISTRANTS
FIFTH INTERNATIONAL MEETING
INTERNATIONAL PURDUE WORKSHOP
ON INDUSTRIAL COMPUTER SYSTEMS
October 3-6, 1977

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